The Builder.

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Some Branches of Ancient Art Work.

IT has not unfrequently fallen to our lot to invite the attention of our readers to various branches of antique art. We have spoken of the general aspect of the antique, as a main department in the education of the artist; and, moreover, as coming under practical question when the progress of decay becomes such as to render utter disappearance the only alternative offered to those who refused any, even the humblest, restoration, or rather conservation.

Especially we were led to dwell upon the subtle and uncommunicable spirit that yet lives in the marbles of Greece; perishing as matter of chemical composition, but immortal, as embodiments of lofty, poetic idea, so long as a fragment remains without crumbling into dust. We have spoken of "motive," and of "character," as these words have meanings of their own in the vocabulary of the real student of art; we have, more recently, touched upon the important subject of proportion, although only to indicate the wide, and not inaccessible, field of research that here lies open to the student. We have glanced at the essential elements of those three styles, or rather three requisites of perfect style, in art, which are known by the terms of Realism, Conventionalism, and Idealism. And we have seen how, again and again, in the history of art (as has been the case in many other branches of human study and contemplation), men of culture that was special, but not catholic, have fancied that they were founding schools, when they were only neglecting principles. We have glanced at the subjects of colour and of shadow, as the special elements of the genius of the painter and of the sculptor. Above all, we have been impressed with the idea that the very central essence of the excellence of ancient art, as embodied during the brief period of its apogee, is the attribute which we have denominated its grandeur. Without making any pretence to an exhaustive treatment of these important portions of a general theory of art, within the limits proper to our columns, we have yet endeavoured to supply something of a guide to a more detailed and comprehensive study, than is possible without some attempt to grasp the general outline of those main principles which are latent (if not vividly embodied) in all true art.

It may be well, in the pursuit of this train of ideas, to fix on the mind the nature of those distinct branches of art, the pursuit of which, in classical times, is proved by the existence of relics, or indicated by the references to be found in literature.

It is, of course, as to the architecture of Greece, that we are able to speak with greater precision than in the case of most other branches of art. This may be characterised as having attained that stage of development at which a style, originally and essentially proper to a wooden structure, had attained perfection under the hand of the mason; while, at the same time, it had not given birth to any example of truly masonic construction, such as that of which the later discovery led to the grandeur of the semicircular arch, and the graceful delicacy of the Pointed Gothic. As to painting, we are almost entirely left to that kind of reflex opinion that is formed from the testimony of those writers who have described the effects produced, but not the mode of their production. A particular branch, however, of the painter's art is illustrated by the fictile vases of Greece, Magna-Grecia, and Etruria. To the earliest specimens which we possess of the archaic period of this ceramic work (which are vases from Athens, Corinth, Melos, Rhodes, Etruria, and Southern Italy), it may be rash as yet to attempt to assign a date. They are chiefly ornamented with patterns which are called geometric, but which probably originated in an attempt to represent wickerwork. Primitive representations of goats, birds, and horses, succeed; although they are at first but sparingly introduced, and are drawn in the rudest manner. The colours employed are brown on an ash-coloured ground. Purple and white are, a little later, combined with brown. Bands of ornamental patterns next make their appearance, and compartments, containing a geometrical figure, a flower, or an animal, are arranged in a manner that recals the idea of the metopes and triglyphs of a Doric temple. Later, we find crimson and white mingled with the brown, and animal and human forms more freely introduced. Later yet, we find vases painted in black and crimson, with incised lines, on a cream-coloured ground. In some of them rude inscriptions enable us to recognise the representations of the heroes of the "Iliad." The latest vases of the Archaic period, which come down to about B.C. 440, exhibit a design painted in black on a red ground, the outlines and inner markings incised, the details picked out with crimson and white. In these vases the red ground is produced by a glaze painted over the clay. The mouth, handles, and unornamented parts of the vase are painted with a black varnish, more lustrous and durable than that of the earlier examples. The representation of the human figure, in action, becomes more and more the central object of the design.

As we advance to the finest period of art, we find the body of the vase painted with a black lustrous varnish, the figures having been first roughly marked out in the clay, and then more carefully finished, after the black background was filled in. The details of the costume, and the inner markings of the anatomy, are given by black lines; and as the drawing (as in the later case of *majolica* ware) had to be executed on the wet clay, great artistic freedom of hand found room for display. The composition gains in simplicity, the figures being represented as much as possible on the same plane, and the faces given in profile, as in the sculptured reliefs of the period. The vigorous and bold proportion of the female type, which forms a feature of the School of Phidias, is characteristic of the finest period of art.

Connected with the painted vases, are those of *terra cotta* ornamented with high relief, or even with some detached figures. The best examples we possess of these are from Magna Grecia; but from the imperishable nature of the material it is probable that much of this work may yet reward the toil of research. The life-like character of these statuettes is at times perfectly surprising.

From work in clay the natural advance of the sculptor's power led him to turn to the nobler material of marble. With reference to this, however, it may be proper to glance at the statement of Winkelman, that the modelling of the Greek sculptors was executed in wax, and that the use of clay was comparatively modern. We think there can be no doubt that this is a misapprehension, such as often arises when those write on art who may be deeply imbued with its spirit, but who have little practical acquaintance with its procedures. The use of clay as a plastic material goes back to the very commencement of history. The potter is one of the very oldest of workmen; and specimens of his work,—bricks, vases, lamps,—rising from the rudest simplicity to something of highly ornate character, very far antedate the most archaic relics of Grecian sculpture. But it is extremely probable that, for casting in bronze, wax was employed before clay. To melt the core, and leave the mould fit for the reception of the metal, was a far simpler process than any by which a solid core could be removed. And it is true that, in the modelling of many antiques, there is a mode of handling that tells rather of wax than of clay. That a statue which it was intended to produce in metal, should be modelled in wax, whether in the first instance, or after a sketch in clay, is therefore an extremely probable hypothesis, not only from the testimony cited by Winkelman, but moreover from this practical point of view. But that the Greek sculptors did not primarily model in clay does not follow from the admission; nor do we take it to be credible as a fact.

A distinct branch of sculpture, of which all examples, and nearly all representations, have perished, was the chryselephantine work. All our own examples of what we may call compound sculpture hold rather to decorative, than to fine, art. We have no warrant, however, for doubting the purity of the taste of Phidias; and when we find that this great sculptor considered that his noblest work was executed in gold and ivory—the colossal statue of Pallas—we can only regret our inability to form any just conception of the effect. We should have been as unable to appreciate the grandeur of the sculpture in marble of the finest period, but for the precious fragments we possess.

Miniature sculpture forms the next branch of antique art. The beauty of some of the gems cut by the most famous artists is surprising. Our most reliable examples are, however, the glass copies, which the engravers produced, on the completion of some excellent work, for general sale. These it has not been thought worth while to forge; so that the questions which rise at every step in this department of research into the antique are avoided with these humbler, yet authentic copies. There is a head of Hercules, a cameo in chalcedony, at the Museo Borbonico at Naples, which, though damaged, is equal to any production of ancient art. The likeness of Alexander the Great, by Pyrgoteles, is another famous instance of this microscopic sculpture. But definite proportion has not been adhered to by the artists of gems. If the best of them are photographically enlarged, this fact becomes most apparent.

Metal work was, in all probability, the field in which the highest triumphs of ancient art were attained, when we regard delicacy, as well as grandeur, of execution. There were limits to the range of the sculptor, in marble, which he could overleap when he wrought in bronze. Thus the reduction of the ankle to its proper size is a process attended with such risk, when, as in the Apollo Belvidere, or the Venus de' Medici, the main weight of the statue bears upon one foot, that proportion has, in such cases, been sacrificed to safety. The left ankle of the Apollo, on which much less weight is thrown than on the right, is an inch smaller in girth than the corresponding dimensions of the other limb. The ankles of the Venus de' Medici

are the only exceptions to the perfect symmetry of the figure of that goddess, below the chin.

The artist who works in metal commands a wider range than any other description of sculptor. This is the case for more reasons than one. Size ceases to be a limit to his imagination. For, on the one hand, he may attain a magnitude that is colossal, as in the case of the famous sun-god at Rhodes; and on the other hand, he may descend to the most subtle delicacy of the goldsmith's touch, as in the shield of Achilles, the Homeric description of which is a proof of the great antiquity of this beautiful branch of art. Again, the worker in metallic relief approaches the confines of painting; and in some cases, such as in the instance of the celebrated "Gates of Paradise," executed by Ghiberti, the modeller displays a style, at once sculptural and picturesque, that is entirely his own. The power of employing both the modelling tool, in the first instance, and the chisel, the hammer, and the graver, afterwards, is also a special gift of the metallurgic sculptor. Chamber sculpture probably thus originated. The *statuette* is essentially a work in metal; the utmost delicacy of finish being here attainable, without that danger of frittering away which arises in treating the less trustworthy marble. But beyond all this, there is an intimate reason why sculptors should have felt, rather than have argued, that bronze was the material in which their art can attain its highest triumph. Marble sculpture is not, as a rule, original. Michelangelo, indeed, attacked the solid block with a sort of inspired fury, and hewed out his vehement idealisations without preliminary model. In the courts of South Kensington is to be found a most interesting proof of this habit, in a female bust from his hand, of which one eye is open and the other shut,—a tentative alternative which any other man would have tried in clay. But marble statues, as we know them, are copies, and to a great extent mechanical copies, of clay models. The only other mode in which we can regard sculpture in stone or in marble, is as an ennobling of work in wood. Greek archaic sculpture denotes this origin for the art of the eiconist. In the stone carving of India we can trace almost the very steps of the transformation of the art. But with the worker in bronze a mechanical step is avoided. The melted metal takes, of its own accord, as it were, the form impressed on the plastic material. In the great contest which every true sculptor feels to be ever going on between expression and finish, the power of the first is most characteristic of clay—the beauty of the latter is the glory of marble. But it is as a modeller, rather than as a hewer, that the copyist of the human form, especially in and under life-size, most happily succeeds; and not only so, but the lines of sculptural composition, the true containing curves, suggest themselves, in a great measure, in the clay. The temptation to a boldness which is out of keeping, is at times irresistible to a worker in wood; it does not occur to the worker in clay. If we contrast two very different figures, the Apollo Belvidere, and the Paul in the new reredos at Westminster Abbey, the difference between the style proper to clay and that natural to wood will be seen at a glance. Each figure stretches out an arm, which directly projects from the general containing lines of the form. But the projection which is easy in wood (and which, moreover, instead of being grand and imposing, is simply awkward) involves, in clay, the addition of some extraneous support (unless iron bars be of set purpose introduced). Hence the falling drapery of the *chiton* of Apollo presented itself as a natural portion of the figure, when modelled in clay. The degree of dignity which is thus given to the statue can be estimated, if we so far obscure it to the eye as to be able to regard it as entirely undraped.

The works in metal of antiquity were thus, especially if we regard their great number, as well as their attainable and obtained excellence, by far the most important of all. There is good reason to hope that many of these works yet remain to be discovered. Among the most exquisite productions of human art may be named a wearied Mercury, in the Museo Borbonico, in which the expression of fatigue on the face, no less than the modelling of the entire figure, is of unapproachable truth. In the British Museum perhaps the very finest bronze is a *statuette* of Neptune, dug up in Epirus, which, with the exception of the right arm, and of the emeralds or garnets which once formed the pupils of the eyes, set in a silver *cornea*, is perfect. Its modelling is of the grandest style; and the earth in which it was long buried, instead of producing that thick and mouldering verdigris which characterises bronzes dug from volcanic formations, such as tufa, has produced a lovely green *patina*, resembling fine unveined malachite.

Were we to select a specimen of that which is noblest in the metallurgic art of Greece, so far as relics are in our possession, or come within our knowledge, we should cite the fine tetradrachm of Lysimachus, which is in the gem-room of the British Museum. The art of the medallist has here attained its supreme expression. It is the case, historically, that the *apogée* of the art of the gem-cutter and of the die-sinker, by no means coincides in date with the noblest triumphs of the sculptor. It is not difficult to account for this circumstance. The decay of the highest excellence of sculpture has been, not only coincident with, but to a considerable extent influenced by, the advance in manipulative power. Over-delicacy of finish detracts from grandeur. This is the case in the noblest work of the Divine Artificer,—the human form. The exquisite delicacy which is the characteristic of feminine beauty, is not so consonant with grandeur of type, as the hirsute veil which man seems to have retained from the period when he was the rival of the lion in searching for his food. The emotional delicacy of the lips and chin of the Cupid of the Vatican, or of the Psyche of the Museo Borbonico, has not the grandeur of the bearded mouth of the Jupiter of Otricoli. The two elements of the beautiful differ. They differ as much as do Justice and Mercy. What has a real cause in nature is easily exaggerated in art. Thus we find, from the time of Pericles to that of Alexander, delicacy of finish, and even that apparent boldness of execution which is the result of prolonged and almost infinite labour, to be continually on the increase, at the expense of the element of grandeur.

With the worker in miniature, however, the advance in manipulative skill is actually an advance in merit. He must rather translate than create. His noblest work is portraiture; when he reproduces, for the constant delight of the taste, some famous work of the sculptor, he does not give a proportionate reduction. We can speak with certitude on this point. By means of the camera we can reduce at will with absolute proportionate exactitude. The result is not happy when carried far. And when we attempt the reverse process, and enlarge, by means of the camera, the most beautiful gems, we find disproportion that is absolutely ludicrous.

The artist in miniature, then, has to seize the salient points of his subject, and so to treat the whole as to make the subserviency of the minor traits harmonise with a nervous treatment of the essential. This is an effort of genius so different from that which produces a statue of life-size, or even a reduction to half size—which is one of the most beautiful scales on which the sculptor can work—that it might naturally be expected to be somewhat later in its development. Such, at all events, has been the case.

In the coin that we have mentioned are combined all the elements of the very highest excellence. We say little of the character of the metal, although there is something in silver, as a material, that is unrivalled by any substance, unless it be bronze that has acquired an unusually fine patina, such as that of the Paramythian statuettes. But, fine as the silver tetradrachm undoubtedly is, a plaster cast (such as the admirable public spirit of the authorities of the British Museum allows any one to obtain from them for a few pence) shows the beauty of the modelling far more apparently than does the coin itself, or its reproduction in electrotype.

The coin is of the diameter of $1\frac{1}{16}$ in., and of the weight of 236 grains Troy, having lost only four grains from the original weight of the tetradrachm. This alone is an indication of the excellence of its preservation. It bears, on the reverse, the legend Lysimachou Basileos (of King Lysimachus) in vertical lines, on either side of a seated figure of Athenæ, holding a winged Victory in her right hand. This figure is the prototype of the Britannia of our own copper coins. But the head on the obverse is that of Alexander the Great, the evidence of a wise reverence on the part of the Thracian King. The coin so far maintains the old "set" of the earliest "incused" money, that the reverse is hollow, and the piece, when new, would have lain perfectly flat on a table if placed reverse downwards, the field being recessed so as to give the due relief to the figure. This allows of an extraordinary boldness on the obverse; and the most prominent part of the design, the conventionalised ram's horn, which indicates the divine parentage of the great conqueror, rises to about double the thickness of the field. This full relief admits of a bold and perfectly accentuated treatment of the profile, of a deep shadow for the eye, the lips, and the nostril, and a deeply cut rendering of the curling locks, and of the Persian diadem which confines them. At the back of the profile, the hair, and the ends of the diadem, float over the field of the coin, into which they almost sink, vanishing by a delicate shadow line. The authenticity of the portrait is avouched by the peculiar angle of the throat, which combines with the other elements of Grecian masculine beauty to give to this representation of the great conqueror a beauty that is not only living, but unique.*

ON THE PROPOSED CHANNEL TUNNEL.

AT the Society of Arts, Adelphi, last week, Mr. Wm. Hawes, F.G.S., read a paper on this subject, in which he entered fully into its geological, engineering, and commercial aspects.

It appears to be generally acknowledged that the only place where a submarine tunnel can be made, with a due regard to safety and economy, is through the grey chalk which stretches across the straits between Dover and Calais; and this being admitted, it only remains to show the cost of, and the time required for, the construction of a tunnel of such dimensions and length as to be practically available for general traffic.

First, as to time. The application of the machine for tunnelling through chalk or any soft strata, invented by Mr. Brunton, a model of which is on the table, will so reduce the time required for the excavation of the tunnel between Dover and Calais, that the period for the completion of the twenty-two miles may be determined almost to a certainty. At Snodland, near Maidstone, where it has been tried, a heading of 7 ft. in diameter was driven at the rate of one yard per hour. This rate, supposing the work to be begun on both sides of the Channel, would require only two years to drive a driftway from 7 ft. to 9 ft. in diameter across the Channel, but allowing for delays and casualties which always occur in works of such magnitude, we may safely say it would be easily completed in two years and a half.

With such a machine, the cost of the excavation of the driftway may be accurately estimated. The cost of the tunnelling machines, the air-pumps, and pumping engines for drainage and for raising the chalk as excavated, can be easily determined. The hand-labour to be employed is also capable of accurate estimate, and would be limited in the cost and the time required for its execution, by its practicability, and has, therefore, demanded the most serious and careful consideration by Sir John Hawkshaw and Mr. Brunlees, as well as by their French colleagues.

The driftway being completed, the cost and time required for its enlargement to the size of a railway tunnel could also be as easily estimated; and it may be assumed that should the driftway be driven successfully one or two miles under the sea, the enlargement might be begun without waiting for its completion across the Channel.

If this course be pursued, the entire work may be completed in five or six years, and at a cost of from eight to ten millions of money; but until the driftway be carried a certain distance under the sea, it is almost impossible to give more than a general idea of the time which would be occupied in completing the work, or the expenditure it would involve.

The shafts on each shore will be sunk to the depth of 450 ft. below high-water mark. From the bottom of the shaft driftways will be driven for the drainage of the works whilst in progress, and for its permanent drainage after completion.

The tunnel will commence 200 ft. above this driftway, and will be driven at an inclination of 1 ft. in 80 to the junction with the drainage driftway, and then at a gradient of 1 to 2,640 to the centre of the Straits, where the tunnel from the English shore will meet that driven

* It ought to be generally known that electrotypes and plaster casts of the coins in the British Museum are obtainable, by permission, from Mr. R. Ready, of that institution. We have reason to speak well of the fidelity and beauty of Mr. Ready's reproductions, and of the low price at which they may be obtained.

exactly in the same manner from the French shore, and being united with it, will complete the submarine railway under the Channel. The drainage will be from the centre of the tunnel to either end.

At present, I have only referred to ventilation during construction, respecting which, so long as the excavating power is obtained by the use of compressed air, there is no difficulty. The results obtained during the construction of the Mont Cenis and St. Gothard tunnels are conclusive on this point. But for the ventilation after completion I will confine myself to the statement of our distinguished engineers, and there can be no difficulty in obtaining by mechanical means a steady current of air through the tunnel at all times, quite sufficient to maintain the purity of the atmosphere. The exact method by which this will be accomplished need not be stated at present: it is sufficient to know that there is a general agreement of opinion by the English and French engineers as to the facility with which perfect ventilation can be maintained.

The net revenue Mr. Hawes estimates at 732,000*l.*, or 7½ per cent. on 10,000,000*l.*

Let us now consider, he continued, how this great work can be accomplished.

There are two distinct steps to be taken. The first, to raise sufficient capital to make the driftway, to test the practicability of the greater work; and the second, when this is proved to be practicable, both on the score of expense and the time required for its completion, to find capital for the enlargement of the driftway into a submarine railway tunnel.

To accomplish the first, or preliminary portion of the work, 160,000*l.* must be raised. Half of this should be found by France and other European States, the other half in England.

If 650,000,000*l.* have been raised for railways without any assistance from Government, because the population have required the convenience and facilities its expenditure affords, is it being too sanguine to expect that 8,000,000*l.*, or even 10,000,000*l.*, will be forthcoming to perfect the present mode of transit across the Channel?

These figures apply only to this country. It is proposed, then, to establish in France and England companies to raise 160,000*l.*, and to begin the works on both sides at once; and so soon as the driftway is bored a sufficient distance under the sea to prove the accuracy of the calculations of the English and French engineers, and the practicability of the work, it is proposed to take measures to bring this great undertaking before the various Governments and capitals interested in its success, with a view to the ultimate provision of capital for its completion.

After the reading of the paper, a discussion followed, in which Sir John Hawkshaw, F.R.S., Mr. J. F. Bateman, F.R.S., Mr. R. Rawlinson, C.B., and others took part.

THE CONSERVANCY OF THE CITY AND RIVER.

GREAT damage and inconvenience have been caused along the thickly-inhabited borders of the Thames by the high spring tide of the 20th inst., which appears to have been one of the highest on record. It is said that the danger was predicted on the 6th of January last by Captain Saxby, who named the tides of 20th March *and 18th April* as the highest that might be expected. As a rule, the poor people who were flooded by the 4 ft. to 6 ft. of water which invaded their dwellings had their furniture and bedding spoiled, and the lower stories of their houses defiled and made unwholesome by mud; even the sewers burst in beneath them; and they had to adjourn to the upper parts of their houses for the time. Much damage has also been done at the wharfs, and in warehouses and other business premises along the banks of the river. Similar floodings have occurred in many places along both the east and the west coasts of the country. Surely the police will extensively distribute precautionary warnings as to the 18th proximo. Better a false alarm than want of precautionary measures on that occasion.

The damage occasioned by the late overflowing is sufficiently serious in extent to call for more than a passing notice. It calls for comment with a view to remedy, and the prevention of its future occurrence as far as possible. The inundation of large tracts of land, particularly of the river-side portion, is a casualty of frequent account in the annals of London. We have often heretofore reaped, and probably will again reap, the fruits of our neglect of the Thames and its tributaries, be these feeders, mountain streams, main drains, or town sewers. It has taken London upwards of one thousand years to learn the science and estimate the importance of embankment. There exists no necessity at present of going back for citations to the period of the Roman occupation to find precedents or examples for pointing a moral. Our own ancient City magnates, from at least the thirteenth century, were fully conscious of the wrong that was perpetrated upon Father Thames, and they made several ineffectual attempts to save our noble river from pollution. From the date, not merely of the council which was elected in the City in 1347, but for some years anterior, the conservancy of the river was a matter of serious concern, and troubled the minds of the civic rulers not a little. Repeated bye-laws were passed, kingly intercession was enlisted, and proclamations, monarchical and corporate, were put forth in every reign, from the third Edward to the fourth George, but still the Thames continued to be polluted and treated as if it were only a scour for the filth of London. The old bye-laws of the City authorities proved inoperative, because they were not supported by any practical system of surveillance. The will often existed to do what was right, but the way was never properly pursued, because experienced, practical skill and scientific ability had no embodiment. Let us be just, however, to our old City masters, and cite one of their efforts, by way of proclamation, made and cried in the time of John de Stodeye, mayor, 31st Edward III., A.D. 1357:—

"Also it is ordered, that no man shall take, or cause to be carried, any manner of rubbish, earth, gravel, or dung from out of his stables, or elsewhere, to throw or put the same into the rivers Thames and Flete, or into the Fosses around the walls of the city; and as to the dung that is found in the streets and lanes, the same shall be carried and taken elsewhere out of the City by carts, as heretofore, or else by the *rakyers* [the rakers or street-sweepers], to certain spots, that the same may be put into the *dongebotes* [dung-boats], without throwing anything into the Thames; for saving the body of the river, and preserving the quays, such as Dounugate, Queenhethe, and Castle Baynard, and elsewhere, for lading and unlading; and also for avoiding the filthiness that is encreasing in the water and upon the banks of the Thames, to the great abomination and damage of the people. And if any one shall be found doing to the contrary hereof, let him have the prison for his body, and other heavy punishment as well, at the discretion of the Mayor and of the Aldermen."

There were other provisions made at the same time, for the prevention of nuisances in the city, and before the doors of the citizens living in the streets or lanes. Now, if the spirit or words of the above proclamation, and several similar bye-laws, passed by the city authorities, had been kept in force, it would not have remained for us to witness in our time, nearly five centuries later, the still worse pollution and abomination of the Thames. Alas! the good intentions of the early City Fathers were but seldom carried out, or, if carried out, it was only for a short period. The evil grew with the age and commercial importance of the river, until it attained a magnitude that required more than bye-laws or proclamations to put it down. Even when, in later times, a stop was put to scavenge contractors and others throwing cart-loads of all sorts of refuse into the river, another and as great an evil almost existed in the matter of city drainage, which received hardly any check until within our own memory. The filth and drainage of the Moor, the city ditch or foss, and the tributary and long-continued humble nuisances of the Fleet and the Wall Brook through some ages played sad havoc with the Thames. Accumulating nuisances growing larger and larger, every year helped to lift up the bed of the river considerably, and impede its navigation. Inundations were to be expected, and, though always dreaded, they were as inevitable as eclipses. As the bed of the river became elevated, so did the city, though not exactly from the same causes, though in both cases there were similar agents contributing their quota. It would be a curious problem to solve, what degree of elevation takes place each century in the plane of London. Lately, when excavations were made for a public building near to the Mansion House, in Queen Victoria-street, a black silt was reached on the old course of the Wall Brook, at a depth of at least 30 ft. Making a reasonable deduction, we may calculate at least, by the site of the Roman pavement, that this portion of the City, including Cheapside as well, has been elevated since the Roman occupation, 20 ft. to 25 ft. at least. Many of the ancient brooks, and streams, and drains of the old City are, without doubt, absorbed, and their disappearance can be explained in no other way than by mere drying up. The course of some is entirely changed, and that of others is buried perchance at a depth of from 30 ft. to 40 ft. below our present pavement in different places in the City. We do not hesitate to say that there are many subterranean ancient streams and sewers belonging to old London whose course now is far below the present bed of the Thames. Occasionally, in excavating for the piers of bridges in tidal rivers, subterranean streams and sewers are tapped, which in former years gave no small trouble to bridge-builders by their welling forth. The colour and taste of the water proved to a demonstration what they were.

The safety of the City from inundations in the future is an important matter, and this safety cannot be secured until the Embankment of the Thames is a completed work on both sides of the river. Confining the subject within due limits, and looking at the matter as a nineteenth-century undertaking, we think the wants of the time demand that the Embankment of the river on both sides, as far as London Bridge, should be performed. The principal objects to be obtained by embanking the river is to retain a proper volume of water in the bed of the river to regulate the conditions of its flow, and to prevent inundations. To properly secure these ends the main drainage and sewerage of the City, in view of the future as well as the present, needs to be attended to. The bed of the river must never be allowed to rise, but rather deepened more and more as far as is consistent with its embanking walls and bridges. There is, however, a danger to be avoided on the other hand in curtailing too much the width of a river, particularly a river like the Thames, which has ever been from the earliest times greatly affected by tidal causes. Mountain freshets and high tides are not rarely concurrent, and there is no way of anticipating their twin arrival. Our standard for river defences and embankments should be based not on high tides, but on extraordinary high tides. What boots it if for twenty or thirty years we are guarded against ordinary high tides, if on the following year millions worth of property is destroyed by a tide reaching from a foot to eighteen inches higher. There is another matter which we cannot pass over without again adverting to. Public health and humanity demand that all underground dwellings should be abolished, and that under-stories and cellars should be used only for the storing of goods. By the river, at least, these precautions should be taken; and whatever regulations it may be necessary to enact, they should be strictly enforced. If the embankment of the Thames was complete between Chelsea and London Bridge, the dwellers on either side would have a right to be held free of all future damage by the overflow of the river, if such was occasioned by the neglect of the Conservancy Board, or other responsible authorities. The embanking of the Thames below London Bridge belongs to the great future, and it is a subject we do not desire to enter upon at present. Whenever that embanking takes place, it need not be for the purpose of a promenade, with parapet walls, but simply a broad line of quays on either side, whereby both public traffic and shipping interests would be equally accommodated.

NEW DOCK WORKS AT BIRKENHEAD.

UPWARDS of half a million of money is about to be spent on new works at Birkenhead, and a vast sum will soon be devoted to increasing the accommodation for shipping at the northern and southern extremities of Liverpool. The works on the Cheshire side of the river include a new wet dock, a graving dock, and a range of warehouses, and in an article on the subject the *Albion* gives some idea of the magnitude of the undertaking.

In 1873 the Trust asked Parliament for borrowing powers on account of works proposed to be proceeded with at the north and south ends of the dock system on the Liverpool side, and in the Act granting these powers it is stipulated that the proposed works at Birkenhead shall be completed within four years, otherwise the borrowing powers then obtained will cease. Shortly after the passing of the Act, the able engineer of the Board, Mr

George F. Lyster, received instructions on the subject, and he at once made preparations for commencing the works.

The sea-wall, a heavy structure of stone, will extend in a line with the existing river walls on the north and south sides of the basin. It will be founded on piles and concrete carefully deposited, the ground being exceedingly soft. Another wall will be erected inside the one facing the river, and the space between them will be filled up, thus forming a quay 175 ft. wide along the east side of the basin. The new dock will be 1,560 ft. in length, the average width 350 ft., and the area 12 acres. It lies between the Morpeth Dock, with an area of 11 acres, and the Alfred Dock, the area of which is 8 acres. Plans for the erection of an extensive range of sheds and warehouses on the quays surrounding the dock are now in preparation. A landing-stage, which will measure 352 ft. in length and 72 ft. in breadth, and which is in course of construction, will be moored in the river just opposite the goods station of the Great Western Railway Company, and will be connected with the quay by two commodious bridges. The works are progressing rapidly.

Accommodation for the overhauling of ships at Birkenhead is provided by two graving docks at the west end of the great float. One of these is 50 ft. and the other 85 ft. wide, the length in each case being 750 ft. Unlike the other public graving docks of the port, the wider one at Birkenhead has a gridiron on each side in addition to the ordinary central blocks on which vessels are usually laid. But these two docks, big as they are, do not meet the requirements of the shipping interests at Birkenhead. They will, however, soon be supplemented by a new graving dock which is to be constructed in their immediate vicinity. Nine hundred feet will be the length of this dock; its passage will measure 60 ft. in width, and its entire breadth between the surfaces of the quays will be 84 ft. It will be the longest graving dock on the Mersey estate, and, consequently, perhaps the longest in the world. Already the contract for the excavations has been let, and it is expected that the masonry will shortly be commenced.

Perceiving the necessity that existed for warehouse accommodation in Birkenhead, the Dock Board recently decided on building warehouses in the neighbourhood of the Morpeth Dock for the reception of general cargoes, and the work of erection is now going on. The block—which, when completed, will consist of three floors above the level of the quay, and vaults below—is 165 ft. long and 104 ft. wide, and the superficial area will be 2,640 square yards. Brick, wood, and iron are the materials being used in its construction. It will be furnished with every mechanical appliance necessary to facilitate warehouse traffic. A special overhead connexion between the sheds on the south side of the Morpeth Branch Dock and the new warehouses will be provided. Merchandise can thus be removed direct from vessels in the dock to the warehouses, and without danger of damage by weather and other circumstances.

The whole of the plans of these extensive works were prepared by Mr. George F. Lyster, and they are being carried out under his direction.

PROPOSED GIFT OF A PUBLIC HALL TO STAFFORD.

A SUM of 1,500*l.* having been offered towards the erection of a public hall for the town of Stafford by Mr. Pochin, the town council met to consider the matter, and a long conversation took place as to the position of the borough with regard to the adoption of the Local Government Act and other matters. Mr. Pochin, thinking that the council had a great deal upon its hands, expressed himself in favour of a hall being built by means of a limited liability company, and towards such object he was willing not only to hand over the 1,500*l.* already given, but to take shares which would increase that sum to 3,000*l.*, giving the interest accruing on that amount to the embellishment of the building, or any other public object. If the matter were taken up by the council at once, this sum would be handed over to them. The question now was, were they, as a council, prepared to carry out the erection of a hall, or was it to be left to private enterprise? If a limited liability company were formed, and 2,000 shares issued, he believed he could find twenty gentlemen in the borough who would become shareholders to the amount of 100*l.* each.

Mr. Cox proposed that the council do not further entertain the subject of a public hall, and that the 1,500*l.* be given into the hands of Mr. Pochin, to whose munificence he paid a high tribute. He thought there was not the slightest doubt that in connexion with a limited liability company 2,000*l.* could be easily subscribed.

Mr. Evans moved that Mr. Pochin's offer to the town council be accepted, and that a committee be appointed to draw up plans for a public hall, and, if practicable, for market accommodation.

After some further discussion, Mr. Evans's amendment was carried by thirteen to four.

Mr. Gibson then formally announced, in the name of Mr. Pochin, that unless a site for a town-hall was purchased, and plans advertised for within a term of three months, Mr. Pochin would withdraw his offer of 1,500*l.*, and hand over the 3,000*l.*, to be utilised by private enterprise. It was then decided that a committee of the whole council should take the matter in hand.

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

AT the ordinary general meeting of the members on the 23rd inst., Sir G. Gilbert Scott (President) in the chair, the following gentlemen were elected:—Mr. G. T. Molecey, of Bombay (Fellow), and Mr. H. J. Lanchester and Mr. W. Reddall (Associates).

Mr. Eastlake (Secretary) announced the death of Mr. Gill, of Bath, a Fellow of the Society, to whose high position in the profession the President bore testimony.

A letter was read from Major-General Sir T. M. Biddulph, K.C.B., addressed to the President, in which Her Majesty's gracious sanction was given to the recommendation of the Council of the Institute that the Royal Gold Medal for the year 1873-4 be awarded to Mr. John Ruskin, M.A.

Mr. W. H. White (Fellow) then read his paper on "Government Architecture in Bengal," part of which we print on another page. We will note hereafter the discussion which followed the reading of the paper.

THE DUBLIN MAIN DRAINAGE.

IT may be remembered that some months since, when tenders were advertised for, the estimates sent in exceeded in amount by many thousands of pounds what the committee, or even the engineer of the scheme, anticipated. The result was a reference back to the engineers to report; and then followed a modification of the original scheme. Some weeks ago, new tenders for the modified plan were advertised for, and there were eight tenders received, the lowest of which now turns out to be 428,000*l.*, and the highest 526,000*l.* Seven contractors tendered for the whole work, and one for Nos. 2 and 3 contracts only. The committee is again placed in a dilemma, and have postponed their acceptance of a tender until the first Wednesday in April, pending the report of the two engineers, Messrs. Bazalgette and Neville, the latter being the borough engineer of the city. Matters have turned out just as we feared, and it is not unlikely there will be another long delay *in re* the financial difficulty.

SANITARY MATTERS.

Wednesfield.—A special meeting of the Wednesfield Local Board, over which Mr. Owen, the chairman, presided, has been held, to hear from Dr. Ballard, of the Local Government Board, the result of his inspection of the district. Its unsanitary state was shown by the fact that during the past four years there had been 102 deaths from preventible causes. This in a population of only 3,700 was really very serious. Fifty of the deaths arose from the pollution of air and water by accumulated filth—the worst places being New Invention, New Cross, High-street, Church-street, Well-lane, and Wood-end. The flagrant want of the district was some system of sewerage, and though Mr. Rawlinson made the same complaint in 1849, the Board had never given the slightest attention to the matter. Attention was drawn to the large number of houses without pure water or proper conveniences, many being altogether unfit for human habitation. Then there was that "monster nuisance," Mr. Bradburn's works. Mr. Bradburn had added to the manufacture of artificial manure that of sulphuric acid, phosphorus, and a process of copper reduction. Night-soil, Mr. Bradburn told him, was mixed with sulphuric acid, and he could not imagine a more horrible and disgusting smell than that which would issue from such a mixture. Dr. Ballard condemned in very strong measures these abominable nuisances, and said the medical officer of health of the district should be consulted, and if he certified that the works were a nuisance, then the Board should take steps to compel Mr. Bradburn to abate the nuisance. After making a number of general suggestions, Dr. Ballard was thanked by the Board.

Wells.—At a special meeting of the Wells Town Council the report of Dr. Purnell, the medical officer of health, and of the inspector of nuisances, was considered *seriatim*. The report showed the town to be in a most unsanitary condition, and noted the existence of nuisances in variety and extent that would equal those in many large manufacturing towns where the urban authority was lax. There were piggeries in close proximity to dwellings, insufficient closet accommodation, and no closets at all, untrapped drains, foul accumulations of manure and refuse, dirty unwholesome slaughter-houses, in some of which horses were kept,—in one the window of a privy opened into it, blood and offal polluted the precincts, and no proper receptacles were provided for blood and refuse. These are only a few of the nuisances unearthed by the sanitary officers; but in all cases the Sanitary Authority has ordered notices to be issued against the offending parties.

Willenhall.—A special meeting of the Willenhall Local Board of Health has been held to meet Dr. Ballard, the Local Government Board Inspector, who has been making an inspection of the district. Dr. Ballard alluded to the contents of several of the Medical Officer's (Mr. Hartill's) reports, and read extracts from them. During the past four years, he said, there had been 357 deaths from preventible diseases. It was well known that the spread of those diseases was associated with defective drainage, accumulations of filth and pollution of the air and water, and the Board had not taken steps to effectually prevent the spread of those diseases. He next referred at some length to the nuisances arising from ditches and open channels, which were filled with filth, thus preventing the free passage of the water. One of the chief faults in the sanitary arrangements of the district was the absence of a proper system of drainage, and he recommended that systematic sewerage should be adopted. The undrained parts of the town were most unsightly, besides being injurious to health, and the Board ought to give their attention to the matter. Clothier's-street was one of the filthiest in the district. Notwithstanding that the Medical Officer of health had called the Board's attention to various matters affecting the town, his suggestions had not been acted upon, and his reports seemed not to have met with the attention they deserved. Dr. Ballard went on to point out numerous nuisances which arose from accumulation of filth at Spring Band and locality. Many of the houses occupied by the poorer classes in the town were damp, filthy, and unfit for human habitation. The ashpits were badly constructed. There was a fair water supply, but there were several polluted wells in the Board's district. The pig nuisance was abominable, and although the Board had bye-laws they had not enforced them in respect of slaughter-houses. There had been some neglect by the Board in the sanitary administration, and he recommended that they should follow the advice of their Medical Officer. He gave a series of recommendations for the proper sewering of the district, and the prevention of the accumulation of filthy matter.

Skelmersdale.—At the first meeting of the Skelmersdale Local Board it was resolved to appoint a medical officer of health for their own district at a salary of 20*l.* per annum. It was next resolved to advertise for a person to fill the office of surveyor, collector, and inspector of nuisances, applicants to state the salary they would require. The Clerk was directed to communicate with Mr. Edward Stanley, with a view of making arrangements with him to take water from Bath Spring. As soon as an answer is received from Mr. Stanley, the Clerk is instructed to communicate with Mr. Goodison, C.E., Liverpool, who will inquire into the water supply and report to the Board; but if a negative answer is received, that Mr. Goodison look elsewhere for a water supply.

ON GOVERNMENT ARCHITECTURE IN BENGAL.*

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

WHILE it is of constant remark in India that, at home, little attention is paid to its affairs, it is also maintained by many Anglo-Indians that travellers are "the curse of the country." But although the former regret with justice that little is known in England of the Empire it is their business to rule, they seldom hesitate to fall foul of any rash visitor who dares to communicate unfavourable opinions he may form on a journey through the great dependency. Perhaps this is inevitable amongst an omnipotent aristocracy which has not long been accustomed to outside criticism. Unfortunately it is easy for the community criticised to fling back at the critics an isolated error, or a distorted fact, and thus cast doubt upon the accuracy of the whole critique, because the enormous area of Hindustan, the difficulty of verifying impressions, and the fact that what applies to one Presidency is often inapplicable to another, render absolute exactness on the part of the traveller a formidable task. To have lived exclusively in Calcutta or Bombay is likely to lead to very little knowledge of India proper; and to say that many of our countrymen, born in Bengal, and who have passed a large portion of their lives in it, have never cared to visit Delhi, Agra, or even Benares, is equivalent to saying that there are Scotchmen who have never seen London, and Londoners who have never set foot in Dublin. The opinions of such people are naturally as narrow as those of the general traveller are superficial; yet even if the latter be disposed to disparage some of the imported institutions of the country, he is sure to be astonished at the gigantic nature of the labour assumed in the government of so vast a territory. An Englishman of sufficient experience to compare his own island with continental countries is necessarily a proud man; but one who has also seen parts of India as it is to-day returns with increased pride and confidence in British honesty and capacity for rule. He may perhaps weigh in a mental balance Modern Britain and Ancient Rome, and waste a thought upon the time when Australians will be clambering over the remnants of Anglo-Indian palaces. But here he will do well to stop, especially if he be enabled to appreciate the present condition of building in Bengal; and if he have seen, or heard of, the vast civil and military constructions which, since the mutiny, have sprung up in different parts of the country, some to succumb beneath their own rottenness and the spontaneous disruption of their walls, others to be condemned as uninhabitable by commissions specially charged to examine them. Public works in India are generally designed and executed by the Government. In Bengal, under the late Viceroy, the civil and military works were separated and placed under the charge of distinct bodies of officials; but the reform has not been carried so far as to confine military engineers entirely to military works, or civil engineers exclusively to civil constructions. The military and civil engineers composing the Department of Public Works furnish India with public buildings, aqueducts, canals, tanks, fountains, railways, drains, roads, bridges, many scientific statistics, and much decorative art of every description. In money matters the Department has had, until lately, only to ask and have. In the science and art of architecture, as in the disastrous question of taste, it is still above control. Its organisation is so contrived as to be capable of undertaking a colossal public building, the decoration of a lady's boudoir, and the macadamisation of a road. It accepts the construction of a bridge or a tunnel, a thousand miles of road, rail, or canal with equal confidence; and each of its officers is expected to superintend, execute, or assist at, all or any of these varied works. That many of them fail is undeniable, but that the majority, like the rest of our countrymen in India, try to do their duty is equally undeniable. Nothing would be easier and nothing more useless than to hold up the engineers of Bengal to professional ridicule; but an attack upon a Department of Public Works is the last resource of literary destitution. I shall describe simply what I saw and experienced, in the hope that others may learn the lesson that has been taught me; and others perhaps will tell whether the manufacture of Government architecture in Bengal assimilates in any way with that of Public Works at home.

There are few, I may almost say no, "practising architects," as we understand the phrase, in India. In Madras, Mr. Chisholm, a fellow of our Institute, is an Executive Engineer, styled by courtesy, Architect to the Government of Madras; in Bombay, Colonel Fuller, R.E., is a Superintending Engineer, styled by the same courtesy, "Architectural Executive Engineer and Surveyor"; while Mr. Molecey, an Executive Engineer, who to-night has been elected a fellow, Mr. Adams, and Mr. Stevens, are Colonel Fuller's assistants. Of these, Mr. Chisholm is the only one privileged to accept private practice. In Bengal, unless an appointment has been expressly made during the last year, there is no Government architect. Both in Calcutta and Bombay there are men who, educated as architects and engineers, are now contractors; and in their premises one portion is allotted to the "architect," just as others are devoted to the smith, painter, and carpenter. The Government sometimes invite them to offer tenders for the erection of public buildings; but however much the higher authorities may favour the contract system, my short experience in Calcutta led me to perceive that the Department itself was opposed to it, and that a call for tenders was seldom intended to lead to serious results.

British rule in the peninsula is directed by the Supreme Government, called the Government of India. Inferior to this are the local governments of Bengal, Bombay, Madras, the North-west Provinces, and the Punjab, which are presided over by Lieut.-Governors; while other territorial divisions, such as the Central Provinces and Oude, are ruled by Chief Commissioners. In the Government of India is the chief branch of the Department of Public Works, at whose head, in 1872, was a colonel of the Royal Artillery. He is the secretary and intermediary between the Lieut.-Governors and the Viceroy for all the affairs of the Department. Each local government has its particular branch of the Department of Public Works; and, in Bengal, during my stay, a civil engineer officiated as secretary, in the absence of the military holder of the post, an unprecedented circumstance. There is also in Calcutta a Mathematical Instrument Department, with another colonel at its head; and though it is said that only bad workmen complain of their tools, both civil and military engineers would be justified, to my mind, in attributing the avowed imperfections of their drawings to the terrible productions of that department, the functions of which could be better performed by any one of the extensive stationery warehouses in Calcutta, and, to all appearance, at a less cost.

The Bengal Department of Public Works is presided over by a Chief Engineer. Under him are Superintending Engineers, who each control what is called a Circle. These circles are cut up into Divisions, over each of which is an Executive Engineer, and under each Executive Engineer is an Assistant Engineer, under whom are Sub-Engineers, clerks of works, foremen, &c., while a host of natives complete the itinerary of departmental service.

The business of the Chief Engineer is necessarily general, as it comprises all Bengal. That of the Superintending Engineers consists of the verification of estimates, the examination of designs, and the supervision of all buildings and other works in course of execution within the circles they control; that of the Executive Engineers is to make the designs and estimates, order the materials, execute the works, and pay for them; that of the Assistant Engineers is to prepare the drawings and make themselves generally useful both in the offices and on the works. The Sub-Engineers, clerks of works, and foremen do what is implied by the name they bear; and native workmen perform the manual labour required in building enterprises. To sum up roughly,—the Assistant Engineer designs the building; the Executive Engineer builds it: thus the artistic portion of the work is made inferior to the mechanical part of it, the architect's functions are degraded below those of the builder—the latter being practically master of the position, since he is the official superior of the man who best understands the design. The Executive Engineer as master of the Architect—his assistant—controls, where as a builder he should be controlled; and he often "measures up" the work he himself builds. If a mistake happens to be made, whereby a wall is put in the wrong place, or built too high, or too thick, he is rarely called upon to alter it, because all such alterations must be effected at the Government expense. An Executive Engineer holds in his hand, as it were, the five orders of architecture, the building materials, and the public cheque-book, together with almost despotic control over his Assistant Engineer, the foremen, and workmen. It is indirectly in his power to alter, condone error, and spend indiscriminately—he and his Assistant being the only people really conversant with the drawings of the building in course of erection, since the visits of the Superintending Engineer, immersed in other business, do not often bring much practical benefit to the work; and, as you can readily understand, it is easy for men of the greatest experience to lose themselves in the confusion of walls and arches if they have not an intimate and personal knowledge of the plans, sections, and elevations of a large building.

If, however, the Superintending Engineer made the design himself and really superintended the work, as the title he bears would seem to demand, the system would assume a more logical aspect. If he were rendered responsible, morally and pecuniarily, the system would enter, if not follow, the high road to perfection; but the virtue of "if" under such a hypothesis would involve much change, and possibly the precipitated retirement of more than one high-placed official to whom seniority has been equivalent to promotion. The "general orders" are very precise about responsibility; and each engineer is understood to be responsible for his particular share of work; but it is difficult to define the limits of his share. The characteristic quality of all departments, regiments, and corporations generally, *esprit-de-corps* renders it almost impossible; for where all are willing to take general blame, none are likely to suffer individually. Indeed, to fix responsibility upon any particular officer under the system at present in vogue in Bengal would be a crying injustice, as the following illustrations will suffice to prove:—During the thirteen months I was in the service of the Bengal Government, two large public buildings were commenced. The plans, sections, and elevations of one of them, with an approximate estimate, having been approved by the Lieut.-Governor, were sent by the Superintending Engineer of the Presidency Circle to an Executive Engineer, with orders to prepare an official estimate, and to commence the works without delay; at the same time he was cautioned as to the precarious nature of the soil, and ordered to make plans and sections of the necessary foundations, the footings of which were to be calculated as regards width and depth, according to the weight of wall they were intended to carry. The plans and sections of those foundations, with a careful estimate of their cost, were in due time sent to the Superintending Engineer, approved by the Chief, and returned to the Executive Engineer with orders to begin. Those foundations were barely completed before a change was necessitated by unexpected circumstances. The Executive Engineer, who had given a great deal of conscientious labour to the study of them, and who was responsible for them, was suddenly despatched to the charge of a Division distant 1,000 miles from Calcutta; another was appointed to the post thus vacated, and the works proceeded. Now it is clear that if those foundations fail, as nearly all foundations have hitherto failed in Calcutta, the original Executive Engineer cannot be called to account, because his mantle of responsibility was transferred to the shoulders of the colleague who superseded him; while each of the many Executive Engineers who have doubtless continued, or will continue, the works can plead, in the event of the failure of any portion of them, that it is due to the foundations which their original predecessor executed. I must add, that the acknowledged architect of both those public buildings (compo structures of no merit whatsoever) was not allowed to visit them while they were in course of erection; but his visionary responsibility was borne by the Chief Engineer who vacated his post almost immediately after they had reached their second story. Another illustration of the difficulty of defining responsibility and of the omnipotence of the heads of departments, is to be found in the New Imperial Museum in Calcutta, a building in the Italian style, with "ornamental" French roofs, the original design for which was made by Mr. Granville, at that time Civil Architect of Bengal. Some of the floors of that build-

* By Mr. William H. White, Fellow. Read at the Ordinary General Meeting, held on Monday, the 23rd instant.

ing were designed to be arched, and the passages vaulted. Soon after the works were commenced an order was issued to substitute iron girders in their place; and walls designed to receive continuous brick arches were weighted at intervals with enormous wrought-iron girders. The obvious consequences followed, and the building is cracked and ruptured in many places; while the public, with little means of learning the truth, believe that the failure is due to the incompetency of the architect, who, if I am not mistaken, has not seen the building since it emerged from the ground.

By imagining this repeated all over Hindustan you have the most gigantic system of manufacture ever carried out by any Government in the world. As a system it would be feasible if educated men were as conversant with science and art as they are with orthography and grammar. That up to the present hour it has failed, no one, not even the Department itself, attempts to deny. Just as the great Clive, charged before a special committee with the misappropriation of plunder, replied with pardonable audacity:—"Mr. Chairman, at this moment I stand astonished at my own moderation." So, with equal reason, an Indian engineer might turn round upon critics who enumerate his failures, and say:—"Gentlemen, I am astonished that there are not more of them." That it is impossible to reform the system without improving human nature in general, and British cultivation in particular, admits of little doubt. Adam Smith said of India:—"It is a very singular Government, in which every member of the Administration wishes to get out of the country, and consequently to have done with the Government as soon as he can; and to whose interest, the day after he has left it, and carried his whole fortune with him, it is perfectly indifferent though the whole country were swallowed up by an earthquake." This is as true to-day as it was in the great economist's time. The peculiar circumstances of British rule necessitate government by Departments; and a Department, as a man who knew India has said, is the paradise of mediocrity. A member of one to succeed must sink his individuality in the general organisation of the whole machine. Even if the authorities, seized with a determination to have educated architects at any price, were to induce some of the leading members of our Institute to spend a few years in Bengal, disorder would be followed by chaos. A professional man to be of use in a Department of Public Works must hold the position of a Superintending Engineer. But to attain that rank is the work of many years, which must be passed in India away often from everything which, at home, promotes the study and development of art and science. To expect that a large body of men, who are giving the best period of their lives to Oriental service, are to cede coveted places to professional engineers or architects, is beyond the bounds of possibility. The reform of public building rests with the Department itself. My own experience showed me that if a Superintending Engineer could combine the qualities of a first-rate architect and a first-rate engineer, together with the business acumen of an educated builder, and the arithmetical specialty of a first-class surveyor, if his constitution permitted him to spend a quarter of a century in India, and to regard his career there as something higher than a monetary speculation, he might perhaps succeed in erecting a few buildings worthy of British rule; but even if he accomplished so much, he must be heroic enough to dispense with artistic appreciation; or, at least, be satisfied with the little that can be squeezed out of the traditional apathy of an Anglo-Indian population.

II. Calcutta is a medley of stucco constructions, at once palatial and petty; dull in the brilliant setting of an Eastern sky; vulgar in the midst of dependent races to whom vulgarity is unknown. The streets are generally broad and the houses lofty, without, until lately, any excrescences to break a skyline monotonous from dilapidated balustrades, cornices, and copings. Before describing any existing buildings, I propose to consider, not what "style" is best suited to the country, but rather the requirements which it is absolutely necessary to satisfy; and the obstacles to constructive security, domestic comfort, and æsthetic excellence, against which it is necessary to contend. The engineer has to provide a dwelling in Asia for a superior class of Europeans, and it must recall the architecture of home. It must be composed of few and often inferior materials, built by native workmen, under the guidance of those whose interest in it if it be not official is speculative; and who, in either case, are generally devoid of the ambition which often actuates client, architect, and builder in this country.

Houses in Calcutta must be placed with regard to aspect, north and south; because during the hot season the only breeze, except when a periodical "north-wester" springs up, is from the south. The windows and doors of all the principal rooms must be wide and lofty, and most of the former must face the south; or some means must be contrived to obtain direct southern ventilation. Each bedroom must have a bath-room attached to it on the northern side; and as the bath-rooms are water-closets as well, private stairs must communicate with them from the garden or compound for the passage of low-caste natives specially employed to serve them—the system of drainage not being extended to private houses, and, indeed, to only one or two of the new public buildings. Large staircases, passages, and antechambers are necessary on account of the number of native servants employed, two punkah-walahs being stationed outside, sometimes each room in a house, both night and morning, all through the hot and part of the rainy seasons. A verandah consisting of broad openings with slender piers or columns, is required to protect the east, west, and south sides of a building, and it should be deepest on the southern side—the south verandah being the principal living-room for the members of a family while the sun is rising and after sunset, during at least six months in the year. A carriage porch must be attached to the entrance, and during eight hours of the day the inmates must be enabled to feel the largest possible amount of the external breeze without receiving the rays of the sun, or even a particle of its glare; because in India, light is heat, and one of the secrets of the Hindustani architects, consisted of a successful method of obtaining light without heat,—a method ignored or disregarded by India engineers.

The positive nature of the climate is antagonistic to European modes of architectural arrangement, both decorative and defensive. For seven months in the year a rain-water pipe is of little if any use; for the other five it is in constant exercise. The Government have therefore forbidden its use in public buildings; and many and strange are the devices employed by the engineers to drain their roofs and terraces within the letter of the law. Cornices and ornaments intended to catch the play of sunlight are not adapted for the reception of continued rain; and stone, or cement, saturated during twenty out of the twenty-four hours, is often injured by the burning sun, which bursts out between the showers. During the rains the public and private edifices of Calcutta present a piteous spectacle; and the damp, unwholesome odour which pervades them, the effect produced upon objects of apparel, upon paper, and all kinds of furniture, serves to show that the precarious nature of Anglo-Indian existence is due in some measure to the buildings in which Europeans are compelled to dwell. The public offices, as well as the majority of private houses, are built without a basement story, or cellars; and a flat terrace-roof covers them. To be damp from beneath, from above, and from the four walls, is the normal condition of a dwelling-house in Calcutta, during at least four months in the year; while towards the close of the rainy season innumerable insects build nests under the verandahs and on the inside of the walls of bed and sitting rooms. To close the windows or doors of any room for the space of a few hours even in the best houses, is to invite every odour with which ill-begotten moisture can pollute the nostrils.

The terrace-roof of an Indian metropolitan residence is often a morning and evening retreat for many of its inhabitants. It might be made a "hanging garden" of the most charming description. Let me remind you that north-western India is essentially the land of the kiosk and the dome. The former is an exquisitely beautiful feature of indigenous architecture. It is a canopy, square, oblong, or polygonal in shape, in stone or marble (sometimes both), supported upon piers or columns, domed and shaded with overhanging stone or marble eaves. Some architect, with more or less reason, has lately erected two imitations of an Oriental kiosk on a building situated at the Middlesex foot of Blackfriars Bridge. If you have seen them, you can imagine the graceful originals grouped upon the house-tops of an Eastern city, and will perceive at once how agreeable such retreats would be on summer nights and mornings, especially when protected by blinds or drapery of some kind. Yet, no engineer has yet attempted to adapt them to European use in India; and during my journey across that country, the only person I saw sitting beneath one—and one of a hideously debased description—was the Nawab of Oude, on the top of his residence in Lucknow. The construction of the dome at a period co-eval with our Middle Ages, seems to have been accomplished by Hindustani architects with peculiar *naïveté*. On the broad plain, ten miles long by six wide, which holds the ruined cities of Ancient Delhi there are numerous domes, large and small, some of which have already existed for six centuries; and if left undisturbed by men they may remain for six centuries longer. How they were built has puzzled, and still puzzles, the world, or, at least, that part of it which knows them. If any one as a boy has put together a grotto with oyster-shells, he may possibly divine the principle, or absence of principle, which directed their construction, and which enables them to stand without ties or buttresses,—inert, without "thrust" of any kind. Now, although in these days of free trade nothing need astonish any one, it is nevertheless surprising that, in a land where the simplest, most logical, and cheapest domes have been constructed by native workmen, it should be thought necessary to use an Italian or a French adaptation of one; and, more, that the erection of domes so imported and constructed of imported materials, should cause inquietude in the breasts of European engineers, who sometimes frankly admit doubts whether their handicraft will stand or fall.

A want painfully experienced in Calcutta is a covered footway; every street in the capital ought to be lined with arcades or colonnades; and the foot passengers and others, descending from carriages into shops or offices, protected by a covering similar to that of the Rue de Rivoli in Paris, or the old Quadrant in London. It may seem extraordinary to advocate such a thing for an Eastern metropolis, but it is still more extraordinary to find that nothing of the sort exists in the European quarter of any Indian city.

The beautiful screens of perforated stone and marble, which abound in Hindustani buildings, are nowhere introduced in Indo-European architecture; yet the manner in which they were used at Agra, Delhi, and Ahmedabad, to counteract the rays of light and to receive light reflected upon adjoining walls, must be familiar to Indian engineers. It is true that in the present state of the communications the stone and marble quarries of the country are of comparatively little use, at least to Bengal. It is cheaper to import marble from England than to obtain it in India, unless of course it is required for the neighbourhood of a quarry. At the same time a cast-iron grating of home manufacture is often preferred, because it is English, to a marble grille of native work; and simple Birmingham, which supplies the Hindus with both missionaries and idols, often sent out to them in the same ship, has firmer hold of Anglo-Indian sentiment than a dozen native cities, rich in art and innate artistic genius.

Among the building materials at the immediate disposal of engineers in Bengal are teak wood, brick, tile, excellent mortar, and *chunam* (this word is often applied generally to all kinds of plaster, mortar, and cement), which is a superior kind of *stuc*, and a cement, similar to that much used by the architects of Louis XIV., made of pounded brick. Iron, slate, terra-cotta, plaster, and cements are easily imported; artificial stone is made in Bengal, and stone of the best description can be obtained within easy railway distance. But of these, wood is a prey to the white ants; brick and slate are conductors of heat, and iron is considerably influenced by it; plaster though a good non-conductor of heat is destroyed by damp; while ordinary cement cannot withstand rapid alternations of sun and rain. Though brick may be guaranteed from water by a coating of good cement the sun inevitably cracks the coating; and a crevice once made the rain penetrates between the cement and the wall, causing more injury to it than if it had never been cemented all. Consequently "honest" brickwork with a little stone bond and a few stone string-courses, is the safest kind of wall for a Calcutta house; but on condition that the wall be built *double*—that is, with a hollow space between an external wall (say two bricks thick), and an internal one (say half a brick thick), the latter to be plastered or cemented, and both

divisions to be connected at intervals with stone or slate slabs.

In a country were an absence of chimneys, kitchens inside the houses, gas-fittings, &c., preclude danger from fire, naked iron can be used with impunity, and with no other protection than paint can afford—at least in the interior of a building. To employ it, however, in the construction of verandahs and roofs exposed to the sun, and to electric action, cannot be too categorically condemned.*

BURIAL-GROUNDS IN SOUTH LONDON.

THE rapid and continual increase in the population of the southern suburbs of London is making itself apparent in the gradual filling-up of the cemeteries and burial-grounds. So large has been the increase in the number of interments at the Lambeth parish cemetery at Tooting, that the number has nearly doubled in the last eight years. This cemetery was opened in June, 1854, and between that date and the end of March, 1873, the total interments had exceeded 49,500. The private cemeteries at Lower Norwood and Nunhead, and the Camberwell Vestry Cemetery at Forest-hill, are also being rapidly filled up; and in view of the increasing value of land, the Lambeth Burial Board has for some time had under consideration the advisability of adding to the Tooting Cemetery. The original area of this ground was thirty acres, which were purchased at a cost of 9,000*l.*: the additional expenses incidental to the laying out of the ground, the erection of chapels and lodges, walls and fences, and the draining of the land amounted to 12,423*l.*, making a total cost in round numbers of 21,500*l.* To provide this sum the amount of 22,000*l.* was raised by way of mortgage on the poor-rates, the whole of which debt will be paid off by the vestry of Lambeth at the end of July next.

In 1869, it was proposed to meet the expected increase in the number of burials, and the consequent want of land, by the addition of four acres of land adjoining the cemetery, which was then available, but the price demanded was considered too high, viz., 3,600*l.*, or 900*l.* per acre. Recently, however, the opportunity has occurred of purchasing about 11¼ acres of land, conveniently situated close to the existing cemetery, at 500*l.* per acre, or 5,728*l.* in all. To lay out this land, and properly fence and drain it, a further sum of about 3,272*l.* will, it is estimated, be required; making the total amount to be raised about 9,000*l.*

This sum will be raised in the same manner as the original outlay was met,—by mortgage of the poor-rates.

Of the original portion of the ground set apart as "consecrated," there only remains sufficient to accommodate the estimated interments for two years longer, while, at the present rate of mortality, the unconsecrated portion will only last another ten years.

The time is fast approaching for earnest reconsideration of our mode of sepulture.

THE ST. GOTHARD TUNNEL.

FROM a report of a lecture delivered at Venice by Professor Fubini we learn that the great work of tunnelling the St. Gothard has made a fair start at both ends. The use of dynamite in place of gunpowder is described as one of the greatest improvements yet introduced in this description of work, since it allows a large saving both of time and money as compared to the older explosive. But there are various modifications in the air-supply machinery lately introduced which add to the comfort and safety with which the work is carried on. The boring machine employed is the Belgian one of Messrs. Dubois & François, which is capable of giving from three to four hundred blows a minute, but a still more powerful engine will shortly be substituted for it. A chain of lamps down the centre of the tunnel brought, by means of a telescope, at some distance from the mouth, into a vertical line with a set of posts carried straight over the mountain, insures the perfect correctness of the direction of the work, which, contrary to the advice of some engineers, will be straight throughout, and about 2,800 yards longer than that of Mont Cenis. The Professor is confident that the line will be completed in 1880, as promised by the engineer in charge, M. Favre, of Genoa, who is assisted in the purely scientific details by Professor Calladon.

* To be continued.

VIBRATIONS OF RAILWAY BRIDGES.

ONE of the principal drawbacks attending the extension of the railway system in populous districts is the nuisance caused by the noise occasioned when a train passes over a bridge. In the ramifications of the railways throughout the large area embraced by the metropolis and its suburbs, it is indispensable that many roads and streets have to be crossed and viaducts carried in close proximity to numbers of tenanted buildings. When the Metropolitan Extension was being carried from Westminster, underground, to the Mansion House, the students and lawyers at the Temple stipulated for certain extra precautions to prevent the possibility of vibration in the superincumbent buildings; india-rubber and felt were placed in layers between the rails and the sleepers, and every care was taken to obviate the infliction of any nuisance on the learned and learning fraternity who had their chambers in the neighbourhood. But the greatest vibration caused by a train passing beneath the foundation of one's house is as nothing compared with that occasioned by the passage of the steam-horse and his heavy load over a viaduct carried on a level with one's chimneys; and this again is eclipsed by the additional horror of its sudden bound upon a somewhat lengthy bridge, whose arch echoes again and again the rumbling, roaring, thunder. A house situated near a bridge, such as those which occur every hundred yards, for miles before the train has accomplished its sinuous course through the outlying districts of London, is really uninhabitable save by those who have iron nerves, or whose ears are, happily, deaf to such sounds.

It has been said that the horses of the present age are degenerating; but a horse that can be so trained as to pass quietly under a railway bridge, while his iron competitor is tearing along overhead, is surely no degenerate creature. His nerves must be of iron, his temper must be excellent, his mettle must be stanch, his courage unflinching: while a lady who can pass coolly through such an ordeal would have been almost acclaimed a heroine in the Middle Ages.

But not merely on this ground are railway bridges a growing nuisance. In wet weather as in dry they are perpetually perspiring great drops of water, which generally fall, with unerring aim and some violence, on the hat or bonnet of the passer-by. People are taken to admire the curious formations of stalactites and stalagmites in the caverns of the Peak, or at the Giant's Causeway; but they need not go so far to see the phenomenon. Any one who has passed under a railway arch is conscious of the incessant falling of drops of water, which percolate through the bridge, and drip from a series of long finger-like formations, which have resulted from the particles of lime brought through with the water. Sometimes an extra heavy train sends a shower of these miniature stalactites into one's eyes; and not only are passers-by annoyed, but paths and roads are actually worn into holes by the fall of water. Where parish vestries are earnest in looking after the interests of those who pay road rates, and paving rates, they have called upon the railway companies to adopt some means of remedying this evil. The result has been the infliction of a still greater nuisance on residents in the neighbourhood. Sheets of galvanized zinc, or corrugated iron, have been attached as a sort of outer skin to the lower side of the bridges; and these, however efficacious their performance of the duty of intercepting the water, are an addition of tenfold the previous noise occasioned by the bridge. Surely the last state of that bridge is worse than the first. To the former rumbling, thundering kind of sound, is added a din caused by the rattling of the zinc plates, which more resembles the united efforts of the "Thunder-makers" at the Polytechnic, all the tom-tom beaters of the Chinese empire, and the iron riveters employed in her Majesty's dockyards, than any single attempt at the production of inharmonious sounds in Christendom. The deaf and the iron-nerved, even, are reduced to distraction, and whole rows of houses are scarcely habitable.

Really the nuisance thus caused is a serious depreciation of adjoining property. No one will live in a house at all close to a railway bridge, and it is a question for vestries and local Boards to see if the offence cannot be reduced.

One thing is evident. It is the duty of the engineers of railway companies in the first place to build a bridge water-tight. This could easily be done by the placing of the iron or zinc plates immediately below the ballast, and providing proper drains. In the second place, it is incumbent upon them to reduce to a minimum the sound produced by the passing of trains. A railway close at hand is a great convenience; but it is an infinitely greater drawback to have one's rest and peace disturbed by the unmusical sounds occasioned by railway bridges as at present constructed.

CHURCH RESTORATION.

THE ARCHITECTURAL ASSOCIATION.

AN ordinary general meeting of the members was held on Friday evening, the 20th inst., Mr. E. J. Tarver (President) in the chair, when the following gentlemen were elected members;—Mr. Frederick Powell and Mr. George Bellingham.

The immediate occasion of the meeting was for the purpose of discussing the question of "Church Restoration."

Mr. G. E. Street, R.A., in opening the proceedings, said that the large assembly he was then addressing fully showed that considerable interest was taken in the subject of the restoration of churches by architects. The more the question was discussed, the more likely were the churches requiring restoration to be tenderly dealt with in the future. The first question which had to be answered was, whether church restoration was either possible or allowable. The scheme of Sir Gilbert Scott for the restoration of Kirkstall Abbey was considered by Mr. Sharpe as weak and wrong. Sir Gilbert Scott was right in thinking that the Abbey could be made to appear as it did originally. There was no reason why Mr. Sharpe should not have the same views of all restorations of buildings. Looking to the fact that a vast number of churches were in use, he (the speaker) could not sympathise with that view. He could not but hold that if they had to be repaired they had also to be restored. Accepting, then, restoration as a matter of necessity, the question arose as to what character it should assume; should it be destructive or conservative? Destructive might appear a strong term to use, but that was the character of the work done in the middle ages. Every man in those days thought his work quite good enough to replace the work that was done before it; and if any alteration suggested itself to him, he invariably made it in his own way. The conservative restoration was, however, the only one that he (the speaker) would advocate. This mode of restoration dealt with buildings, and historical as well as architectural monuments. When that mode of restoration was determined upon, it was necessary to consider how to become fitted for such a work. In the first place, it was of the greatest importance that a spirit of enthusiasm and reverence should be cultivated. It was almost impossible to carry that feeling too far; for the more it was cultivated the more tenderly would any work be dealt with in the progress of being restored. Too often it was seen that there was not that real reverence for old work that would make one shrink from destroying it or from damaging it in any way whatever. This spirit of love for old buildings was possible for any style of architecture, and could be applied to the remains of a Greek or Roman building, which it was desirous to see destroyed. But how much more should Englishmen have that feeling for the old buildings spread all over the country, all of them being connected with religion and the religious history of the country. It was almost impossible not to feel an interest in them. All good architects must be archæologists. To say that an architect was not an archæologist was a foolish thing. The good architect, as a man who had to build, must be an archæologist, artist, and constructor; otherwise his work would be valueless. All men of any skill, to be good architects, and especially those who would be good church-restorers, must be good archæologists. In almost every part of England, in the Middle Ages, there were local schools of architecture, and the character of their work differed immensely in one district from that in another; and it was necessary that an architect, to be a church-restorer, should know something about those local schools. He must pay attention also to the local variations of materials. A distinct difference of style of architecture would be found in the works of the Middle Ages, caused by that variation of material. He must deal not only with stone and flint, but

with timber and combinations of timber and plaster, and flint with stone, and flint without stone. In many ways the effect upon architecture by the variety of material was great. Supposing, then, that they had a church to restore in a conservative form, the first course would be to make an examination of the building in a very careful manner. The ground-plan should be commenced with, as giving the key to the whole subsequent history of the building, noting particularly all the variations of date in the different parts of the work. When the analysis of the building had been made, and it could be seen where one man's work began and left off, some of the coats of plaster on the walls should be pulled off. It was of the greatest importance that this should be done very carefully, because in the course of removal of the coat of plaster that covered the walls would be discovered the changes that gave almost the whole of the historical value to the building, and its preservation was much to be desired. The rediscovery of the old features was one of the most interesting things to architects. In the Chapter-house of Westminster Abbey, Sir Gilbert Scott had, by a very careful examination, made the old remains assume their former appearance; and in a great work in which he (the speaker) was engaged at Dublin, he had found a perfect mine of old stone buried in the wall. Such discoveries were encouraging to the patient student. The strong desire to see every damaged stone taken out and repaired had often to be objected to; and in France this failing was once very prevalent. In many cases stone was over-repaired. In repairing old stone-work it was very important that it should be done with the same kind of material as the old stone; but there was a difficulty sometimes in obtaining the same material. There were many who maintained that it was wrong to show the old stone wall, because such was not the original intention of the builder; but the restorers of a building could not look at it in the same light as those who built the structure. As to the external stone-work of churches, he considered it a great mistake to clean it, for it was one of the many charms of the old building. If the stone-work was much decayed, then it was necessary, in order to preserve the record, that the stone should be taken out and restored; but that might be done without interfering with the interest attaching to the old building. In dealing with the restoration of old features, it was absolutely necessary that none of them should be removed. Some of the old features might appear to be in such bad taste that their removal might seem to be an improvement; but the more attention was given to this point, the more likely would the conclusion be arrived at to leave them alone as far as possible. With regard to the question of the enlargement of churches, as it regarded the question of restoration, the best counsel he could give was to make all necessary alterations with as much respect as possible for the old buildings. Each case should be dealt with on its own merit. Where a vestry was required, it would be well, if possible, to make it by means of a screen. If restoration could be done without touching the outside wall, so much the better. In the use of masonry in repairs there arose a great difficulty; for there was a striking difference between early and late masonry. All work that was done should tally with the old; and in stone-work the putting in of little pieces of stone should be avoided, to prevent any appearance of patch-work. The repair of wood-work in old buildings was a work about which persons appeared less careful than they did about stone-work. The restoration of roofs should be done with the same kind of material and the same scantlings. He would rather tie an old work together with iron than take it down and put a new work in its place. It was constantly possible to save a great deal of old woodwork by supporting it, and it might be made fairly ornamental. The retention, too, of the old church ritual arrangements of the interior should be observed,—such as the pews and galleries. In this work it was only too frequent now to proceed upon a cut-and-dried system, without reference to the particular feature of a particular church. The porch with an archway was a feature of a picturesque character in many of the old churches; but in many restored churches it was found that a door had been ingeniously fitted into the arch, and the effect of a porch as such was destroyed. Another point was the position of the font, which had been altered from the west to the east side of one of the columns. Then, too, with regard to the level of the floor of the church, it was desirable to keep to the old level. Little peculiarities were the essence of the picturesque in a building. The arrangements of churches for seating was very difficult; for there were often in the transepts older remains in such places, so that if the transepts were filled with seats the remains were likely to be obscured. Seats ought not to be placed against old monuments. With regard to galleries, no one now desired that they should be built. The old features which were found by the restorer should be carefully retained. He would never restore old carving,—it was a great mistake, and would thereby lose its interest. That did not apply to mere masonry; it was true only so far as concerned carving, painting on the walls, and such works as required the hand of the artist; and he would not advise their restoration for fear of damaging the old remains. The remains of old reredoses which were found were generally so much knocked about as to be difficult to restore but in a conjectural way. To do much painting on the walls was a mistake, for directly one began to paint it must be carried out everywhere, and then there was the risk to run of making everything look new. A good deal of decoration in a building might be obtained, if it was required, by paintings on panels, altar furniture, and screens. The inconvenience of old churches was a source of constant complaint. With regard to the question of costs, that was always a difficulty which architects had to deal with. In dealing, therefore, with church restorations ample estimates should always be made; and if but a small amount of funds was forthcoming, they should do a little work well instead of attempting much badly. In drawing up specifications for the restoration of old work, it was important that there should be a special provision that all curiosities should not be the property of the contractor; but that they should be preserved to be placed back again into the building. In conclusion, he would say that the essence of the necessity of church restoration was that it led to the study of English architecture in every part of the country. It was a great inducement to do so; and there were now more inducements for it than formerly. The Pugin Travelling Studentship led of necessity to the study of old work; for it could not be gained unless the students competing had given some time to that study. It was of the utmost value to them as architects in their career that they should have that living architecture which was always before their eyes to study. Those who spent a few weeks or months in patient toil in such a study would be the men who would be the best fitted for the work which all were called upon sooner or later to carry out. The study of original work would make them become very much more accomplished in their art than they otherwise would be.

Mr. Penrose considered that most of the points laid down by Mr. Street were incontrovertible. Between the views of Mr. Sharpe and Mr. Street there was not, he thought, much divergence. With respect to the subject of leaving the walls unplastered, if it was intended that they should be left uncoated with plaster where the covering would obscure ancient work, he quite agreed with that view; but if it was meant that the whole of the wall of a church should be left without plaster, he thought it would take away a great deal of the character of the old work.

Professor Kerr said, the views they had heard were from a representative man, who had, all his life, taken up the position he then maintained, which was, that in restoring ecclesiastical remains of the middle ages, the example of the French should not be followed. They had heard something of the difference between archæology and architecture; and the opener regarded the work of restoration, not as a work of architectural design, but as a work of archæological maintenance; and he would say, do not renovate it, but support that which was old and maintain it in its veritable antiquity. That view seemed to him (the speaker) the essence of common sense in the work. He had a high opinion of the French as artists, but upon this point there was a difference of opinion between the two countries. Every old church that existed throughout England was venerated by the people of the parish; he could not tell whether a similar feeling existed in France, but if it did it was not expressed in the same way. If a French artist was set to restore a church he did all he could to turn it out a new church; and of this English architects complained. It might be better, he thought, to allow the nineteenth-century restorer to do his work in his own way in order to show to future ages the abominable character of his judgment.

Mr. Phené Spiers considered that the architectural students had had a great service rendered them that evening; for there had been pointed out to them the elements of study which must give to them a far greater interest than they would otherwise have felt in the study of old buildings. Those who took the greatest interest in their summer studies and travels would be best capable of dealing with church restoration. As regarded the difference between English and French restoration, he fully concurred in the views expressed. The question whether the student should keep to English work alone, he considered a difficult one; it was a difficulty for a young artist not to be occasionally induced to follow some foreign work. If, however, they desired to have any originality in design, it was necessary that they should make themselves acquainted with all that had been done before.

Mr. Clarkson said that the question arose in his mind as to at what point of time they were to consider that any work became incongruous, and upon what degree of art value were they to know whether anything was necessarily to be destroyed or to be preserved. He thought that a general rule could not be laid down in either case. He thought that the purpose of restoration was to preserve buildings for themselves and for posterity.

Mr. Robertson said that with reference to the question of the connexion of archæology and architecture, there was something to be said on both sides. It might be said by one who knew something of the subject, that archæology was distinct from architecture, and that its aim was entirely different. Old buildings might be considered in various points of view,—archæologically, architecturally, and that of utility. Viewed from each of these points, an old building would be treated very differently. He thought that a good deal of the discontent which had arisen with reference to the very numerous restorations, was caused because they had not been conducted with a more archæological view. There were other questions, as to whether the architect of the nineteenth century should be allowed to restore, or whether he should not limit his dealings with such buildings simply to their repair and maintenance; and also the question as to what was the nineteenth-century style.

Mr. Pownall wanted to know, in the case of a church that had been repaired, whether any other additions which were to be made should be done in accordance with the earlier or the later portion of the work.

Mr. Street, in replying, said that as regarded the style in which additions should be made, it seemed to him, in spite of all that had been said, that each man should have his own style. The whole end and object of his remarks were to the effect that the old work should be left to tell its own story. It was not desirable to repair old stonework where it was slightly damaged; but where an old feature was found to have been put in for an intentional purpose, it was not fair to old architects to allow it to be entirely demolished. There was a great difference regarding the restorations effected by the English architects as compared with French; but he flattered himself that old English buildings had very many devoted admirers amongst the French.

THE ART QUESTION, FROM ANOTHER POINT OF VIEW.

THAT a building should be designed after such a manner as, both in external appearance and internal arrangement, it should show the purpose for which it is erected is a proposition which few will dispute. Generally speaking, there is little to find fault with in this repect in the aspect of recently-erected places of worship, for NO class of buildings so distinctly tell their purpose to the passer-by as our churches. And it is very right and proper that such should be the case, but that it should be done at the expense of convenience and the personal comfort of the worshippers, it is not so easy to maintain.

The element of ecclesiological demonstrativeness is usually so strongly maintained in plan as to limit greatly any attempt at originality, and artistic elegance is considered of less account than a rude severity of manner more in accordance with the spirit of a period when refinement was rare than with that when culture is widely spread. In this respect architecture is follow-

ing in the wake of the sister art of painting. The Pre-Raffaellite movement introduced a new phase into that art, a certain mannerism which had a charm for many, although it did not fulfil the utmost requirements of the art. It was rather a protest against the slovenly disregard to nature and truthfulness which prevailed, and its votaries in due course burst the chrysalis, freed themselves from the narrow limits of their voluntary prison, and took to the freedom of the wing. Such may also be the case with architects.

Since the beginning of this century various principles of architectural art have been advanced, one supplanting another in due course. First, it was maintained that in the works of classical antiquity, certain rules were observed, and the examples of the application of these rules were to be regarded as infallible guides. Then followed "the battle of the styles," in which a rising party maintained the superiority of Mediæval examples, both as to art and suitability to climate. Next followed a crusade against academic formulæ and copyism, and an attempt to strike out a new style; but the examples of "Victorian" architecture were not such as to call forth admiration. Concurrent with this movement was another, which sought to develope the styles already in existence, taking as a starting-point the architecture of the thirteenth century, and so gradually to lead up to the formation of a new style. And, latterly, a small section has reverted to the style of the time of Queen Anne, as affording a more advanced stage from which to start in quest of the holy grael.

A building may be perfectly correct in its details, composition, and arrangement, and yet be cold and spiritless, and another, although exhibiting no special originality, may possess a certain charm and grace, which reveals that the hand and eye of an artist were engaged in designing it. Add to this latter quality a tincture of originality, and we have the highest point yet attained in the architecture of modern times, and in no class of buildings has this point been so often reached as in our churches.

If we trace the gradual development of any style of architecture, we shall find how little there is which can be called original in the respective examples. Nay, even so subtle are the distinctions, that it is with difficulty we can separate those of the same era in contingent countries. It is only by taking a broad view of the subject, and comprehending an extended portion of time, that we can see the marked distinctions which constitute a new style. One nation borrows a leading idea from another. The Egyptian, Phœnician, Assyrian, Etruscan, and Roman styles of art all gradually blended into and influenced each other. So also was it with the Byzantine, Lombardic, Norman, and Gothic.

Since the advent of the Renaissance, there has been no continuous development, but isolated examples may be discovered of the application of classical forms in a different manner than before, and to these have been given the general name of Italian. In Northern Italy an effort was made to introduce the Gothic style, but being of foreign importation it did not accord with the traditions and feelings of the people; it was not generally accepted, and where it was it did not bear the true character of the style, but retained much of the classical feeling and manner.

Great as was ancient Rome, she was constrained to take her art from Greece; she had no art of her own, nor were her people possessed of a truly artistic tendency. We modern Britons are the subjects of a realm greater than that of Rome; we had at one period of our history a native style of architecture, which produced great and noble results. We have the noblest possessions, the largest commerce, and the greatest wealth of the nations of the earth. This has tended to give us a more exalted notion of our own capacity, and induced us to look less to extraneous sources than heretofore. It has strengthened the national feeling and the regard for our own history and traditions, and classical influences have become proportionally weaker. This tendency has been shown in a marked degree in our literature and in our school of painting, and it has also appeared in a minor degree in the adoption of a Mediæval style of architecture. But this architecture, as practised amongst us, has not been accepted as a true and permanent response to the sentiments of the age, and we are still in a state of transition and uncertainty as to the future.

The revived taste for Mediæval art led to the adoption in the church of certain forms and observances which had for ages been in desuetude; and to have all things in keeping, the most rigid adherence to ancient forms and styles has been insisted upon. Is this state of matters to continue, or is it only as the last flicker of the candle flashing spasmodically before it expires?

Ours is an iron age. We use that material to an enormously greater extent than did our ancestors. Our mechanical achievements have been great, but our artistic triumphs, where are they? The question how to use iron as a constructive material in an artistic manner has not yet been solved. A building should not only be strong, but appear to be so, in order to fulfil the requirements of art; the ignoring of this axiom has in every instance produced painful results. This is particularly the case where a trabeate style is used, for in such the supports should not only be stronger, but more frequent than is necessary, in order to produce a good result. The most artistic way of spanning a large opening is undoubtedly by using arched construction properly abutted; and in that case the construction should be visible, and not concealed.

The absence of dignity in iron supports was so apparent in the great cone of the Vienna Exhibition that it had to be supplemented by a mock arcade. Such a mode of procedure may be allowable in a temporary structure, but would be most unsatisfactory in one of permanent monumental character. We have had examples of the perishable nature of the material when tried by fire, and, considering its liability to expansion and contraction, the suddenness with which an unseen flaw brings about a collapse, and the action of time upon its granular formation, its durability is doubtful.

If, therefore, iron is neither a safe nor a dignified material to use, we must fall back upon stone, brick, and wood, in order to produce a truly architectural effect, employing iron tentatively for constructive and decorative purposes.

STUDY OF SCULPTURE AT THE ROYAL ACADEMY.

PROFESSOR H. WEEKES, R.A., lectured on Sculpture on the 16th inst., at the Royal Academy, Burlington House.

In the course of his remarks he said that sculptors did but reflect in art what was in themselves, whatever the extent of their genius. There had been many men unlearned who had succeeded in becoming good sculptors; but had they been better educated, so much the better sculptors would they have made. These men had defects which were the result of their ignorance, and their excellences were their own; for it was the men and not the art that succeeded. Men with extensive ideas, by being enabled to choose a wider range of subjects, had a better chance of success. A good education of a general nature tended to refinement of style in work, and to the removal of vulgarities. He would urge students to read earnestly not only those works which were closely connected with their profession, but also those which were likely to lead to the enlargement of their minds, so that they could think soundly for themselves. This advice was given by one who had experienced the result of neglect in that direction. The works of Plato, Xenophon, and Pliny he would specially recommend for the earnest perusal of the students. The student, in his selection of subjects, should choose those which by association belonged to his own country; for, through the neglect of that association, sculpture seemed sometimes as though it would fall out of place, and become no longer needed. The sculptor, to become popular and instructive, should bow to the requirements of the many, and direct his work towards their good sympathies. With regard to the tendency to adopt the nude in the productions of sculpture, he had no doubt that the learner found it necessary to enter well into that study, as it conveyed the clearest indication of all the movements of the human frame, as well as the most direct expression of its beauties; and without a thorough knowledge of it a good work could be produced by no sculptor. However, it did not follow that the nude was the sublime, or *vice versâ*; they must be separated, and each exist without mutual aid or assistance. That students should entirely do away with the nude in their designs, he would not advise; for if they did, they would be deprived of one of the most powerful aids of expression of art; but he would advise them to be more sparing in its use in their compositions. Both the climate of the country and the habits of the people were somewhat adverse to it; and it must be remembered that sculpture had to adapt itself to civilisation. The purposes of nature, as they existed separately and in different works, should be looked to, and students would then find a key that would open to them a store of knowledge, and which would make them ardent students and devoted admirers of her beauties. They ought not to criticise her ends; nor ought Phidias even to stand between nature and art. Some persons had an idea that art could not be taught; which in a qualified sense must be true; but if it were literally true, art would have sprung up at once to perfection instead of gradually rising, as it did. The sculpture of Greece was the growth of years, until Phidias carried it to the point beyond which it could not go. The student, he hoped, would repel that idea with regard to the teaching of art as utterly worthless, and devote himself seriously to the study of the schools of art. No one ever succeeded to any great extent untaught, or by inspiration. The want of proper accommodation in the Academy led the student to copy in relief only, which system, of course, had its disadvantages. With respect to modelling, he would warn students against exaggerating the defects of their models; they should model as much as possible with their fingers and thumb, which was done to a great extent by Flaxman. When using wooden tools for modelling, they should avoid the use of small and sharp-pointed instruments. He would beg to caution them against always beginning and never completing, but would recommend them to finish the models, whether they were studies for life or of a more imperfect character; and by all means they should be mindful of cultivating the habit of carefulness. In the late exhibitions the tendency to depend too much upon truth was very evident in the work of men in the prime of life, and probably in the prime of their art. This was not seen in the productions of older men. In endeavouring to produce real imitations of nature, the student should avail himself of those licenses, the use of which enables him to approach nearer to the truth than a mere blind copying of fact would do. Referring to the Coliseum at Rome, he said that this was Rome's great architectural work; and no one could deny but that it was greatly admired, for its immense size connected it with the sublime. There was, however, no very great ingenuity of construction about it, beyond the admirable way in which its vast interior was arranged. Reduced, as it was, both by the waste of time and robbery, it was an enormous structure, which, owing to its simplicity and uniformity, rendered it much more impressive than another more varied design would have been. The heavy masonry of the building was characteristic of the people who had erected it. With regard to Venice, the excessive colouring of the works there deprive them of the power of expression. In every street and canal this colouring prominently presented itself.

THE PLANNING OF ANCIENT CHURCHES.

THE BELFAST ARCHITECTURAL ASSOCIATION.

AT a meeting of this Society held at the Museum last week, Mr. Young delivered a lecture "On the Planning of Ancient Churches," which was illustrated by a large number of ground plans. The lecture began with a brief sketch of the position in which the Christian Church found itself in the early part of the fourth century. The internal arrangements of the Roman Basilica, or Court-house, with its various adjuncts, were described, and the reasons adduced why the early Christians adopted this model for their Ecclesiæ, or assembly-halls. A typical Christian Basilica, containing all the parts referred to in the old writers, was then explained, a diagram of the Church of St. Clemente at Rome being shown as the one now remaining most nearly approaching it. But by far the most important of these structures must have been the great five-aisled Church of St. Peter, erected about A.D. 330, on the site of the Circus of Nero, where tradition pointed to the martyrdom of the apostle. Although every vestige of this building was removed to give place to the more famous modern St. Peter's, fortunately drawings were carefully taken. The *atrium*, or forecourt, was of enormous size, and had in front of it two lofty bell-towers; but these probably not original. The nave of the

church was nearly 400 ft. long and 80 ft. wide, and the extreme width, including aisles, was 212 ft.; so that the area was about the same as that of the great cathedrals of Seville or Milan. The *bema*, or sanctuary, had the singular arrangement of transepts extending beyond the outer walls, one arm of which was connected to a circular building of considerable size, whilst a similar one stood a little way from it on the same side, and both were placed on the *spina* of the ancient circus. Although one of these was popularly thought to be the tomb of Honorius, and the other that of St. Andrew, there are strong reasons for thinking that they were erected by Constantine to preserve the remains and honour the memory of Peter, apostle and martyr, and those who suffered with him in the persecution of Nero. Descriptive particulars were given of the plans of several churches, dating from the fifth to the tenth century, in which the circular or polygonal form had been adopted, both for public worship and for ritual and ceremonial purposes. Of these the very remarkable galleried and domed church of San Vitale, at Ravenna, was explained in detail. It was remarkable as having so completely captivated the fancy of Charlemagne as he passed through Ravenna on his way home from being crowned Emperor at Rome, that he resolved to erect a church of the same style in his own capital, to serve also as his mausoleum. The result was the Dom Church of Aix-la-Chapelle, a building which, although much mutilated by later additions, is still of the highest interest in the history of art. The remains of the church of St. Lorenzo at Milan, of the fifth century, were referred to as the earliest example of a circular church enclosed in a square ground plan. The last plan described was that of the church of St. Michael, near the city of Angoulême, where a small specimen of an octangular building is to be seen constructed entirely of stone, both walls and roof.

THE DEMOLITION OF ST. ANTHOLIN'S CHURCH.

WITH the exception of the tower, which is to remain, all traces of the old church of St. Antholin, at the corner of Sise Lane, Queen Victoria Street, will shortly have disappeared. Last week workmen were busily engaged in removing the pews, galleries, organ (valued at 100*l.*), pulpit, and other interior fittings, which had been sold by tender the week previously, and the bare walls alone now remain. The materials of these have since been disposed of, and prior to the edifice being taken down the churchwardens have given notice that after Monday next they will proceed to remove and re-inter the remains of those buried there whose relatives and friends may not have undertaken that duty. The churchwardens also intimate that the Ecclesiastical Commissioners will pay the expenses of removal to any other consecrated churchyard or burial-place, not exceeding 10*l.* in each case. The remains of those not removed by their relatives will be removed and re-interred under the tower.

There was a church here, then called St. Anthony's or St. Anthonine's, as early as the twelfth century. It was rebuilt about 1399, and again in 1513. The fire of 1666 destroyed it, and the present church was completed by Sir Christopher Wren in 1682. The interior is covered with an oval-shaped dome, which is supported on eight columns standing on high pedestals. The carpentry of the roof is interesting.

INTENDED NEW CHURCH AT ADDISCOMBE.

WE are asked to announce that in the above competition, the first premium, 50*l.*, has been awarded to Mr. Thomas Porter and Mr. Aston Webb, and the second premium, 30*l.*, to Mr. S. Brookes. All other designs have been returned except one, bearing the motto, "True Economy," the author of which is not known.

The Exhibition of Appliances for the Economical Consumption of Fuel now open in Peel Park, Manchester, seems to be a success. It has been visited by nearly 40,000 persons up to the present time, including most of the practical and scientific men of the day, and special deputations have come from France, the Government of Saxony, and other countries.

THE LONDON FORESTERS' ASYLUM, BEXLEY HEATH, KENT.

THE "Ancient Order of Foresters," as the association calls itself, is one of the largest organisations of working men in the United Kingdom. If any one should doubt the fact, let him visit the Crystal Palace on what is termed a Foresters' Fête Day. They are traditionally alleged to have been founded by Robin Hood, of Sherwood Forest celebrity, "the First Forester," and hence the claim to their name. They more probably owe their origin to the influence of the writings of Sir Walter Scott, as likewise do, to a great extent, the revival of Gothic architecture and the erection in modern times of a monument to the memory of Richard Cœur de Lion. The Foresters are neither politicians, trade-unionists, nor sectarians; religion and politics being prohibited in their discussions. Their objects are of a purely philanthropic nature. Like Robin Hood, "who took from the rich and gave to the poor," they take from each other in their better days in order to relieve themselves when distressed. Besides a sick-fund and a benevolent-fund, they have also a widow and orphan fund, for the benefit of which the *fête* at the Crystal Palace is annually held. The Order has been making rapid strides lately, morally, financially, and numerically; and many of the members of the London Foresters having determined it would be better for their head-quarters not to be held at a tavern, they have recently erected what is known as the Foresters' Hall, in Wilderness-row, at a cost of 7,000*l.*, besides the value of the land. In addition to this step, many of them also determined, in 1862, to establish an asylum for the old, blind, and infirm members of the Order who had attained the age of sixty years. They therefore associated or banded themselves together under a "deed of trust," bearing date November 12th, 1864, to provide "a comfortable home; an income of 6*s.* per week; home and pension for widows of members; fire and light; medical attendance and medicine;" and, to secure these objects, members are eligible (without passing through the trying ordeal of election) at or over sixty years of age. About 1,400 members of the Order having subscribed, and the committee having collected sufficient funds, their first step was to purchase a small estate of 5¼ acres of freehold land at Bexley Heath, in the county of Kent, which was done for the sum of 1,275*l.* This estate is opposite the twelfth milestone from London, and is situate on the high road from London to Dover. The committee next adopted a plan for running a proposed road through the estate, reserving the northern portion of about two acres, whereon to erect the asylum; the remaining portion to be let on building leases, in order hereafter to create an endowment fund.

The illustration which we publish shows the centre portion of the asylum, which in its outline or block plan forms the shape of a recumbent letter ⊓, consisting of an east and west wing on either side of the centre building. This centre building will have a master and matron's residence on the ground floor, and a committee-room 22 ft. by 16 ft., and conveniences. In the basement will be coal-vaults to supply coals to the whole of the asylum,—about 80 tons; two entrance-porches (one surmounted by a bell and the other by a clock tower) lead to two corresponding staircases, which both lead to the chapel on the first floor, 32 ft. long by 22 ft. wide, capable of accommodating 100 persons. Each wing is to consist of six pairs of houses, or twenty-four houses in all. There is also ample room on that portion of the estate set apart for the asylum for erecting twenty-four houses more at some future period; each pair of houses will have a front entrance-porch, with rooms on the ground floor each 15 ft. long by 11 ft. wide, fitted with cupboards and pantries; facing the entrance-porch inside is a passage leading to the outhouses, and a staircase leading to the first floor,—here the arrangements are the same as on the ground floor. The outhouses consist of coal and water closets. Thus the plan is so arranged that each house can be made to accommodate either one or two inmates as the committee may hereafter consider advisable or as funds permit. The height of each floor is 8 ft. 6 in.

The elevation is in the Tudor style of architecture (modernised) for economical reasons, the material being selected stock bricks, with white Suffolk brick dressings and Portland stone cills and copings.

The first stone of the first four houses was laid on the 28th of September, 1872 (being the first portion of the west wing), by Mr. Richard Isham, the chairman of the Institution, Mr. Horne, of Norwood, undertaking the contract for 643*l.* (exclusive of painting), Mr. W. F. Potter being the architect. These houses are now completed and occupied,—eight inmates and their wives, fifteen persons in all, being elected into them on the 1st of May last.

It is expected another block of houses will be commenced shortly.

In conclusion, we would mention this is the first Institution of the kind that has been erected entirely from the pockets of working men, though we understand they would not refuse, but would be glad to receive, assistance from others if such aid were offered.

THE CHURCH OF ST. THEGONNEC, FINISTERRE.

THE department of Finisterre, in Brittany, abounds in interesting and curious churches, most of which, however, are of late date, being either the latest Flamboyant or Renaissance in style, and they were with few exceptions erected during the sixteenth and seventeenth centuries.

Of the Renaissance churches now existing in this department, that of St. Thegonnec is the most singular and elaborate, and is perhaps the most perfect example to be seen of a thoroughly Breton church and churchyard with its "Calvary," triumphal arch, ossuary, and cemetery-chapel.

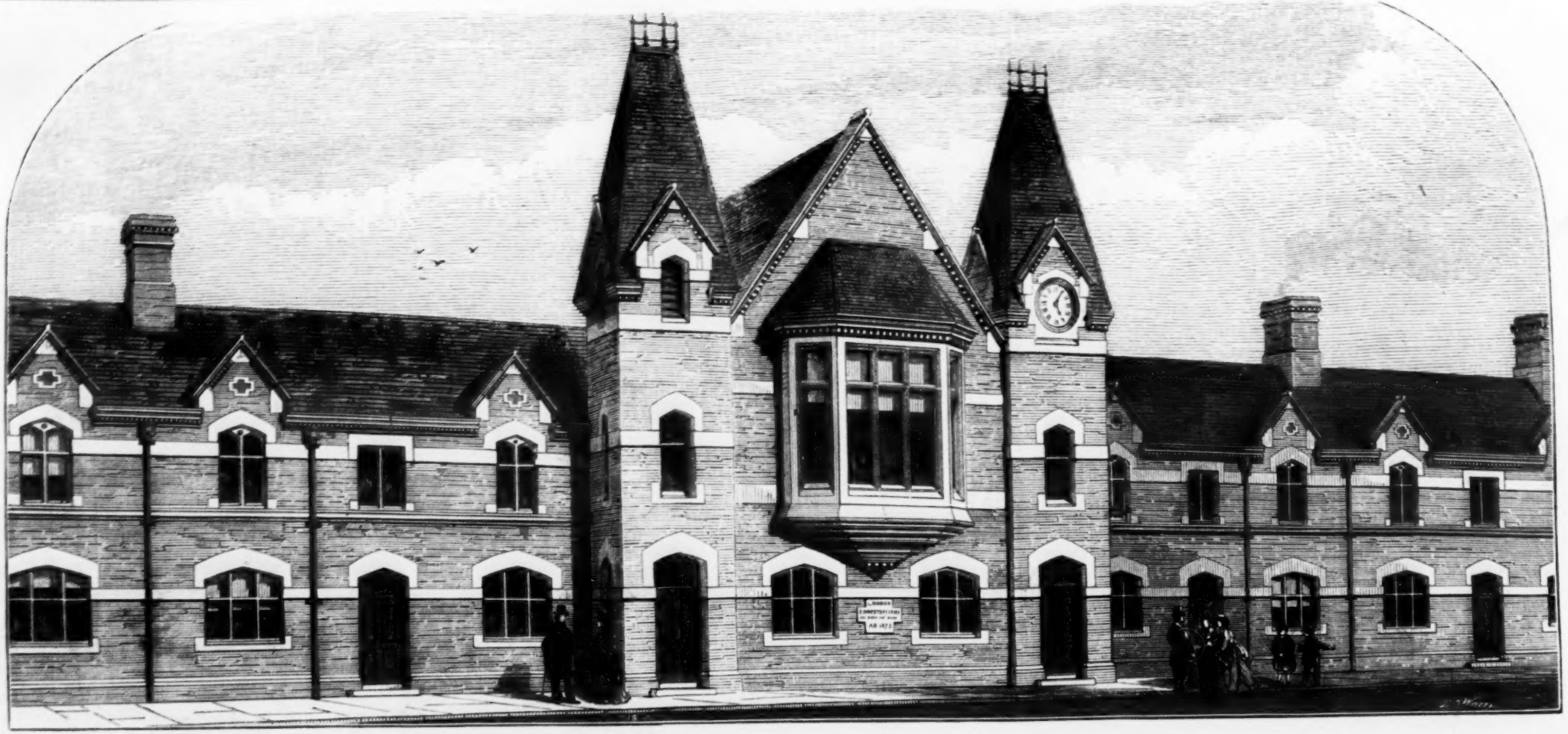
The church of St. Thegonnec is a cruciform building of moderate dimensions, consisting of an apsidal choir, transepts without aisles, a nave with gabled aisles, a large square tower crowned with a dome at the south-west angle, with a porch at its base, and a small tower crowned with a spire attached to the western gable. The last-named feature is the only portion of the church which is of an earlier date than the sixteenth century, and probably dates as far back as the end of the fourteenth century. At first sight it looks even earlier, but the detail is exactly similar to that found in most Breton spires of the end of the fourteenth and beginning of the fifteenth centuries. The architecture of the rest of the church of St. Thegonnec is of a most remarkable development of the Renaissance, very wild and fanciful, but singularly picturesque and effective. As the whole building is erected in granite, the detail is, although intricate, rather rude and large in execution.

The tower and porch of the church are the most elaborate portions of the structure. The former is inscribed with the date 1605. The calvary, which consists of three columns, bearing a representation of the Crucifixion, standing on a lofty podium, is profusely adorned with sculpture, and bears the date 1610. The ossuary and mortuary chapel form a building two stories high, terminating to the south in a lofty apse, adorned with gables and pinnacles, and is seen to the extreme left in our illustration. The great churchyard-gate, flanked by stone stiles on either side, is a grand feature, and is here called the "triumphal arch," and in reality it bears some resemblance to the old Classical erections of that class. The date upon this "triumphal arch" is 1587; and it is rather singular that it shows far less Gothic influence in its details than the mortuary chapel, which is inscribed with the date 1677!

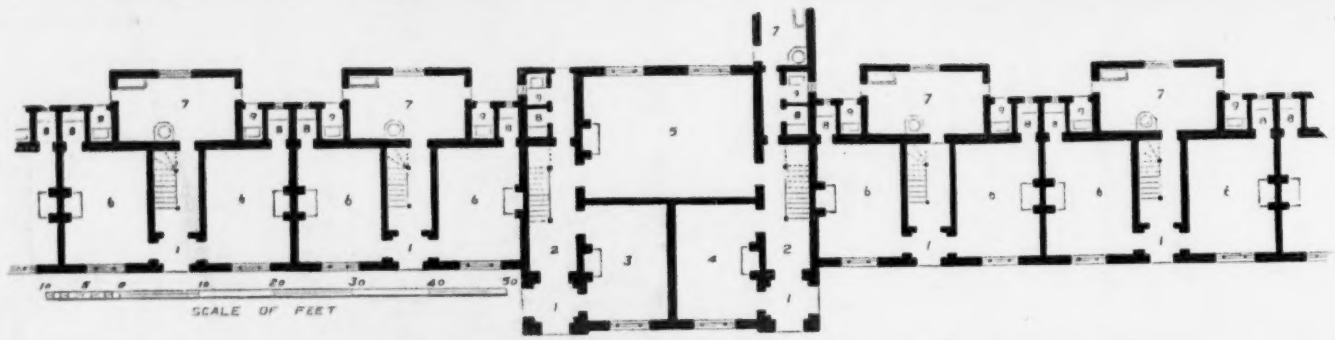
The interior of the Church of St. Thegonnec is far less interesting than the exterior. It contains, however, two remarkably fine reredoses of the seventeenth century, and in the sacristy is a superb processional cross of the same date.

The interior of the mortuary chapel is plain, but has a very pretty wooden barrel-vaulted roof, and in the crypt which occupies its basement is a remarkably fine representation of the "Entombment." The figures are all life-sized, and carved in wood, and are painted in "proper" colours. This fine work of art dates from the year 1702, and shows what excellent sculptors the Bretons were down to a very late period.

A Wall Blown Down.—A long length of newly erected wall, at the North of England Wagon Shops, Hartlepool, now in the course of construction on the outskirts of the town, has been thrown down by the force of a gale, and four workmen were buried in the ruins. Two were found to be but slightly bruised; but the other two had to be conveyed to their homes, one suffering from a fractured skull, and the other from serious wounds.

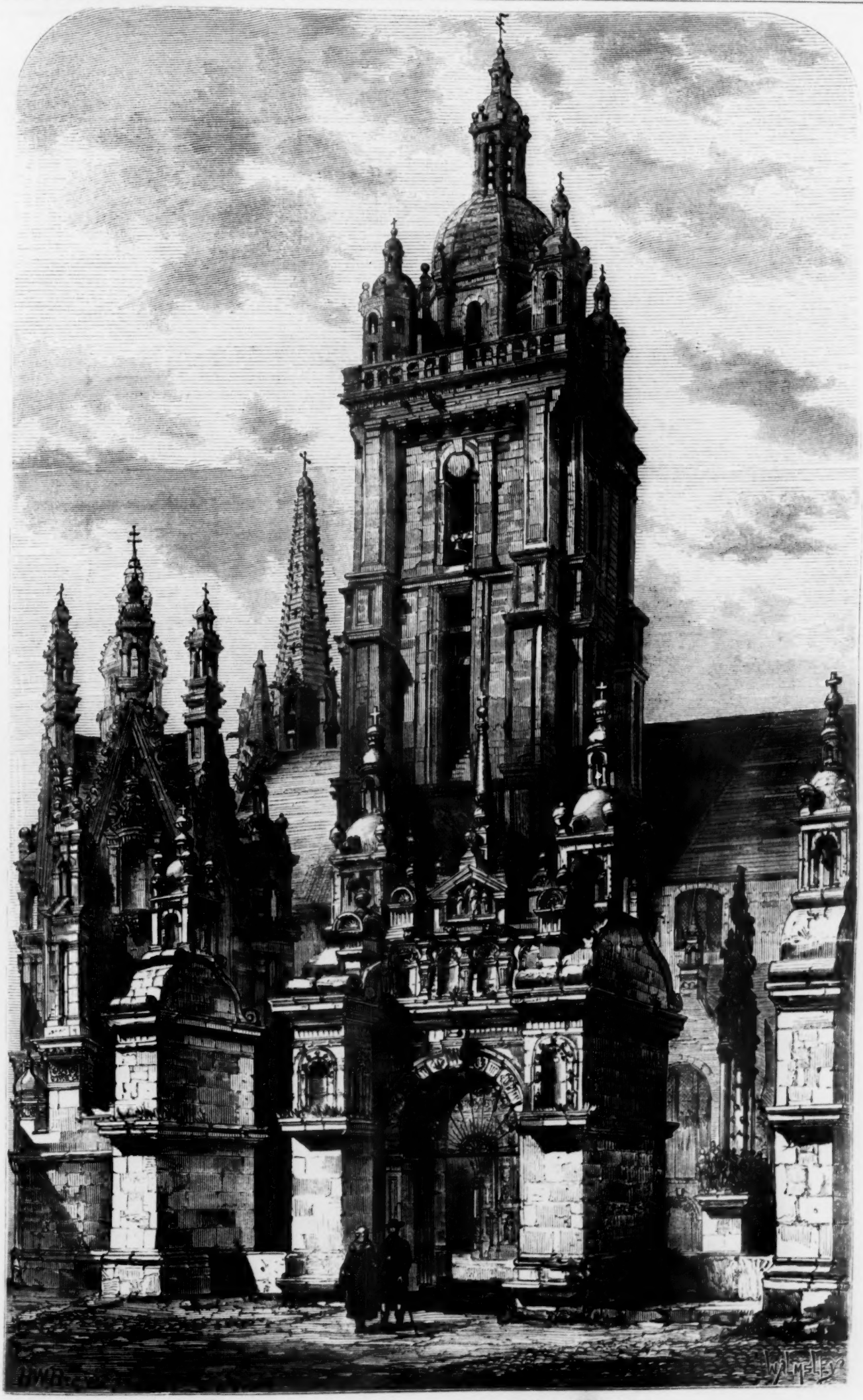


1. Porch.
2. Hall.
3. Master's Residence.
4. Matron's Residence.



5. Committee-room.
6. Living-room.
7. Washhouse.
8. Closet. 9. W.C.

THE LONDON FORESTERS' ASYLUM, BEXLEY HEATH, KENT.—MR. W. F. POTTER, ARCHITECT.



THE CHURCH OF ST. THEGONNEC, FINISTERRE, BRITTANY.

ON ARTIFICIAL FUEL.*

IT is so evident that great advantages would be gained by coal operators, and by the public generally, from the utilisation of what is known as coal dust, slack, waste, or culm, that it is to be wondered that manufactories to transform this worthless material into a marketable fuel are not erected everywhere in the mining regions. The immense accumulations of coal-waste to be found in those regions are really a nuisance to the inhabitants and an eye-sore to the travelling public. It is generally admitted that, on an average, from 40 to 50 per cent. of the entire coal production, both in America and in Europe, is converted into dust or waste. The utilisation of this waste has been a problem which scientific and practical minds have tried to solve for a number of years. Partial results have been obtained by which a certain amount of the waste of coal mines has been utilised, and this only in Europe, where a gradual and constant increase in the cost of the natural coal has given to the manufacturers of artificial fuel a fair chance of profit, but it must be admitted that, compared with other branches of industry, the progress made in the utilisation of coal waste has been very slow. The enormous increase in the cost of coal in England, France, Germany, and Belgium during the last three years has, however, brought again before the public, and this time prominently, the question of utilising the waste created everywhere that coal is handled.

Bituminous coal dust will coke well, and it is much used for that purpose, but the demand for coke not being in any way equal to the supply of bituminous small coal from which it might be made, a great proportion of the latter is left underground. A small proportion of bituminous slack is used by blacksmiths, and even in peculiar grates, for engineering purposes, but the largest part above ground is thrown into rivers or piled up around the mines. It is estimated that the quantity of waste exceeds thirty millions of tons.

Although several establishments have been created in France, England, and Belgium for the purpose of converting coal waste into marketable fuel, that branch of industry is at present quite in its infancy. France has 28, and Belgium 9, manufactories of artificial fuel. In England the principal seat of these manufactories is in South Wales.

Coal-dust can be manufactured into solid lumps in two different ways: by simple compression without the addition of any cementing material, or by agglomeration with cements.

In England, Messrs. Bessemer, Rees, and Buckwell, and in France, MM. Baroulier, Evrard, and Loup have patented different processes for the compression of bituminous coal-dust into solid lumps without cement. The coal manufactured had a great heating power, but it could not bear handling and transportation.

Bessemer, heating previously the bituminous slack until it was brought to a plastic state, forced it, by a piston, into a long tube whose diameter was gradually reduced and from which the compressed coal was forced in a continuous cylindrical shape. By means of a revolving knife, the fuel was cut in sections of any required length, as fast as it was forced out of the tube. This process required very powerful machinery. Bessemer was compelled to reduce gradually the length of the tube and to increase its thickness, as it burst very often. The process required a large amount of natural coal to heat the dust to a pasty mass, and while being heated it eliminated from the coal the greatest part of its volatile constituents. The application of Bessemer's process has long ago been abandoned.

Buckwell and Evrard compressed the bituminous waste into moulds without heating it previously. Although a powerful pressure was applied to the fuel the product could not bear handling.

Baroulier used circular iron moulds of a certain depth, open on top and at the bottom. These moulds were filled with coal-dust, and this dust was compressed by hydraulic pressure; more coal was then added, this again compressed, and so on, until the moulds were completely filled. The process, although a real improvement on Bessemer's, had some of its defects, and the manufactured fuel could not be sold in competition with the natural coal.

These are the only serious attempts which have been made to convert bituminous coal-dust into solid fuel without cement. Rees took out an English patent for a process similar to Baroulier's. He did not meet with more success than my countryman did.

Among the numerous cements which have been patented for the manufacture of artificial fuel are to be found the strangest substances, such as spoiled flour, blood, gum arabic, animal and vegetable oils, cow-dung, rakings of roads, sweepings of houses, chalk, common salt, sal ammoniac, sulphur, solutions of glue, alkaline silicates, alum, copperas, &c., &c. It is unnecessary to add that of these singular materials none have ever been brought into practical use.

Among the cements which have been used to a certain extent may be cited rosin, asphalte, petroleum, coal tar, and its derivative fluid, and dry pitch, lime, plaster, starch, and clay.

Professor A. S. Bickmore, in a very interesting paper on "Coal in China," read before the American Association, says that "from time immemorial, in the north of China, coal is ground to dust and mixed with clay, that it may burn more slowly."

In 1603, a pamphlet entitled "A new, cheap, and delicate fire of coal-balls," was published in London by Sir Hugh Platt. This gentleman recommended for use in common fire-places, a mixture of coal and clay, moulded by hand in the shape of *balls*. He also used another mixture, which consisted of coal-dust, tanner's bark, sawdust, and cow-dung.

Another pamphlet, also published in London, in 1679, and entitled "An excellent Invention to make a Fire," contains the following recipe:—

"Take three parts of the best Newcastle coal, beaten small, one part of clay; mix these well together into a mass with water; make thereof balls, which you must dry very well. This fuel is durable, sweet, not offensive by reason of the smoke or cinder as other coal fires are, beautiful in shape, and not so costly as other fire, burns as well in a room even as charcoal."

In an article on the coal-basin of Eschweiler, M. Clère, a French engineer of great reputation, states that—

"At Liége (Belgium), coal-dust is mixed with clay, pressed by hand in the form of balls, dried in the sun, and stored away for domestic use. That kind of fuel is there called *kockets*."

I can add to this, that even to this day, not only at Liége, but everywhere in Belgium, coal-dust is used in the same manner.

There exists in Belgium a certain class of working women, who earn a scanty living by converting the coal-dust into solid fuel. They call at every house in front of which a load of coal-dust has been dumped, offering their services. These poor creatures can be seen daily in the streets, always two or three together, each one of them pushing a wheelbarrow loaded with clay, in which stands a shovel. They try their best, if the house is occupied by people in easy circumstances, to obtain a little more than the price which is usually paid to them. As soon as the price is agreed upon, they go to work in earnest; the coal-dust is shovelled all around so as to form a circular bed of about 1 ft. in thickness. From 25 to 30 per cent. of clay is diluted with water and sprinkled over the coal, which is well mixed with the clay by means of the shovels first. Then, putting on wooden shoes and slightly lifting their skirts, they commence to trample upon the coal, turning round the coal bed from the circumference to the centre, and back again from the centre to the circumference, following each other like ducks. When the whole surface of the coal bed has been trampled upon twice, the mixture is turned over with the shovel, and the trampling recommences. After five or six operations of the kind have been gone through, the coal and clay have been worked to a plastic mass. This is piled up in a heap, and, seating themselves on their wheelbarrows, these poor women proceed to compress the fuel in the shape of balls, by hand. These balls are then dried in the sun, after which they are ready for use.

This very primitive and original way of mixing and compressing coal-dust into lumps has never been patented.

In some parts of Germany, the trampling on the coal is done by men on horseback. In the Rhine regions, the mixing of the clay with coal is an affair of constant occurrence.

At Ham-sur-Sambre (Belgium), in 1859, under the direction of M. Darbois, machines, invented by M. David, a French engineer of merit, were erected for the purpose of manufacturing, by mechanical pressure, solid lumps from semi-anthracite coal-dust, mixed with 15 per cent. of clay. With these machines, lumps of cylindrical shape were pressed, also cylindrical lumps with perforations half an inch in diameter, through the centre. These machines were very expensive, and their production was very limited. In 1861, they were replaced by cheaper and more productive machines, invented by Mr. Martin from Liége (Belgium). These machines, making egg-shaped lumps, met with more favour, as the product was very similar, to the lumps pressed by hand. Martin's press is still in operation at Ham-sur-Sambre.

At Tamines-sur-Sambre (Belgium), in 1862, under the direction of Mr. Cavenaile, the company of the "Charbonnages réunis de la Basse Sambre" (united collieries of the Low Sambre), of which I was at that time general agent, erected also Martin's machines to convert the coal-dust into egg-shaped lumps, by using 18 per cent. of clay as cement. Martin's press made only one lump at a time. The feeding was very defective. This slow and very imperfect method of drying economised fuel but required a large number of boys.

Baudry invented a drying oven, with shelves all round. It required two hours to dry the fuel. Labour being relatively cheap in Belgium and coal selling high, no improvements have been made to suppress unnecessary handling. Notwithstanding the defects of Baudry's process, it is still applied in Belgium, the product containing 18 per cent. of clay and not being impervious to moisture. The large percentage of clay and the fuel not being able to stand exposure to the weather are the greatest obstacles to the development of the manufacture of artificial fuel by the use of clay as a cement. Asphalte, rosin, and petroleum, as cements, have been found wanting in cohesive property, and also too expensive. Coal tar and its derivative, fluid pitch and dry pitch, have been the most extensively used.

The idea of mixing coal-dust with coal tar originated with Peter Davey, an Englishman, who, in 1821, took out an English patent for it.

From 1821 to this day a considerable number of patents have been issued, both in this country and abroad, either for so-called new processes or for the machines to apply them.

Among the inventors who have really improved the means of manufacturing artificial fuel, by using either coal tar, fluid pitch or dry pitch, the names of Grant, Rathwell, Cooke, Wylam, Warlich, Dobrée, Moreau, and De Heynin are prominent.

Fluid and dry pitch formed a good cement for bituminous and semi-bituminous coal-dust, but it did not succeed as well with anthracite and semi-anthracite waste, which is mined in South Wales and in some parts of France and Belgium. Before the cement is consumed the bituminous artificial fuel is coked, and consequently it does not crumble in the fire. It is not the same with anthracite or lean coal-dust. When cemented with coal tar or pitch, or any other resinous material, the cement consumes in the fire more rapidly than the coal, and the particles of coal, having lost their adhesive coating, crumble in the fire and fall through the grates without being consumed.

Resinous materials expand when burning, while clay, on the contrary, contracts progressively when submitted to elevated temperatures. Clay, used alone, would not have given a fuel impervious to moisture. It was supposed that, by mixing clay and pitch with the coal-dust, the fuel manufactured would not only be waterproof, but would remain in the fire, without crumbling, until consumed, the shrinkage of the clay compensating for the swelling of the pitch.

Among the experimenters in that direction we have men who have really improved the manufacture of artificial fuel. The most eminent of these inventors are Chabannes, Sunderlandt, Stafford, Oram, Geary, Goodwin, Mohum, Sterling, Albert, Newton, Holcombe, and one of the great Smith family.

All these attempts were unsuccessful. The presence of pitch in the fuel made it unfit for domestic use, and the clay impaired its combustible character for manufacturing purposes.

Patents were also granted to several inventors for a mixture of bituminous and of anthracite coal dust, and coking the mixture. The first one of these patents was granted, in 1823, to John Christie and Thomas Harper, in England.

The result was the same as with Bessemer, Baroulier, and others. The machinery was too expensive, and the product was not marketable.

* Condensed from a paper read before the Franklin Institute of Pennsylvania, in January, 1874, by E. F. Loiseau, and fully reported in the Journal of that Institute.

The most singular patent ever issued was granted in 1840, to Thomas Kerr, of England, for a new composition for artificial fuel and other purposes.

"This composition is formed, first of the 'rakings of roads, or streets, or other public ways, or the sweepings of houses, offices, and other buildings; or of the ashes of coal or other fires; or of small coal, culm, breeze, or of river or sea sand, or of free-stone or other stones pounded into dust, or of any other mineral or vegetable substance in a state of dust or powder.'

Secondly, of chalk, or any other similar calcareous substance of a drying and retaining nature, ground into a fine powder.

Thirdly, of tar, or pitch, or oil, or rosin, or some other substance of the like bituminous, fatty, or inflammable nature, such as the common Archangel tar, in the same state as imported, coal-tar as it comes from the gasworks, the pitch that is manufactured from coal after the naphtha has been extracted, whale-oil, linseed-oil, and other oils.

Fourthly, simple clay or common salt. These ingredients described under these four heads are combined in a variety of proportions, and used for fuel and . . . . . for an infinity of other purposes."

Some inventors, thinking that coal does not contain sulphur enough, and probably supposing that it improves the fuel, especially for metallurgical purposes, add to their mixture, as described in their specifications, large quantities of sulphur, some of them as much as 3 per cent.

A large number of patents have been granted in America for artificial fuel. Most of them are modified copies of foreign patents, and a good number denote in their description a complete ignorance of the calorific properties of fuel and of the laws of combustion. The only one which, in my opinion, possesses real merit, has been lately granted to Dr. Joshua R. Hayes, of Winchester, Pa. This patent was issued on March 4th, 1873.

Mr. Hayes uses coal-dust, clay, and asphaltum; but although the manner in which he combines these materials is new and ingenious, the product will be liable to the same objections made against the fuel manufactured in Europe from coal-dust, clay, and pitch, by Stafford, Oram, Goodwin, Geary, and others.

The manufacture of artificial fuel, although being far from having attained the importance which it must attain in the near future, has been developed more rapidly in France and in Belgium than in England. English coal is harder than French and Belgian coal; and, until within the last three years, the price of coal in England was so low that there was no inducement for capitalists to invest their money for the development of an industry which presented but poor prospects of good dividends. But increase after increase in the price of coal during the last three years has entirely changed the state of affairs. Large companies were organised last year, with immense capital, for the manufacture of "patent fuel" by different processes. The last one patented in England, and which has also been patented in this country, is the invention of Martin Rae, of Uphall, North Britain. It consists in mixing with coal-dust 15 per cent. of what he calls a bituminous mastic. In this process we have again a mixture of clay, coal-dust, and some other bituminous material, fluid shale pitch.

A company was organised in May, 1873, with a capital of 1,000,000 dollars, under the name of "The Diamond Fuel Company," to apply David Barker's process.

In these two processes, as well as in the old one of cementing coal-dust with pitch, or rosin, or asphalte, a large amount of natural coal is consumed, not only to dry or carbonise the product, but also to heat the cement and the coal-dust itself. If the dust was not heated, the cement would not adhere to the particles of coal. There is also the unnecessary handling in carrying the fuel to the drying-oven, and removing it when dry.

Both Martin Rae and David Barker are inventors, not only of the process, but of the machinery for its application.

The mixing-machines in Europe are almost all constructed on the same plan: they consist of vertical or horizontal cylinders, differing only in height, or in length.

Although the compressing machines used in Europe are numerous, they are all modifications of four distinct mechanical modes of applying pressure. First, by means of rollers; second, by pistons in closed moulds; third, by pistons in open moulds; and fourth, by pistons pressing cylindrical lumps with a hole through the centre.

Most of the machines have also been tried to convert peat into a dense fuel. Some of them have answered the purpose very well—Milch's machine, for instance. Large peat factories are in operation at Stalbach, Halle, Haspelmoor, and Neudstadt, in Germany; and at Montangin in France.

I will now proceed to describe what appears to be their deficiencies.

It is evident that no artificial fuel containing a resinous substance will ever be used for domestic purposes, on account of the smoke and of the bad odour. Another objection is that such a fuel is liable to spontaneous combustion. No objection of the kind can be raised against artificial fuel cemented with clay and milk of lime.

By mixing the coal-dust and the cement in a vessel which contains only one single shaft with blades the materials are turned around, always in the same direction; it takes a long time before they are brought to a plastic state. Increasing the length or the number of horizontal mixers requires too much valuable space and is very expensive. A better result would certainly be obtained if the diameter of a vertical mixer was increased, and if several upright shafts commanding each other and consequently revolving in opposite directions, were used instead of a single one. The knives of these shafts crossing each other in all directions, would undoubtedly perform a quicker and better work than the blades of one single shaft. Practical experiments have demonstrated this fact.

In my process, I use the slack without heating it or drying it previously. The moisture which it contains varies with the state of the atmosphere. Therefore I am compelled to regulate the supply of lime water accordingly. The difficulty of ascertaining the state of the materials, inside the mixer, suggested the idea of placing sliding doors around it. These doors facilitate the cleaning of the mixer and the removal of stones or pieces of iron which are found quite often in the coal-dust. By means of a movable spider, which allows the removal of each shaft without interfering with the others and without removing the stationary frame in which they stand, a broken arm or a worn-out one can be replaced by new ones in half an hour.

Although the compressing part of some only of the European presses is defective, the feeding part of almost all of them is very deficient. The materials to be pressed containing at certain times more moisture than at other times, the feeding of these materials to the press ought to be reduced or increased accordingly, and, to effect that purpose, simple and efficient means are necessary.

The pressure should be applied gradually in order to expel, as much as possible, the moisture contained in the mixture, and avoid cracks, which are the unavoidable result of a sudden pressure. An excess of compression spoils the fuel, prevents its free burning, and makes the ashes adhere to the surface of the lump, instead of falling through the grate into the ash-pan. The fuel must be sufficiently compressed to bear transportation and reasonable handling, and be still porous enough to insure free combustion. The shape of the fuel is also of great importance. Square lumps have too many sharp edges, which break off easily when the coal is handled, and the flat surfaces meeting very often in the fire prevent the free access of the air. Cylindrical-shaped lumps are better, still they have sharp edges left. Round or egg-shaped lumps are evidently to be preferred. It is not without some good reasons that this shape has met with favour for nearly three centuries in Europe.

To compress the plastic composition into round or egg-shaped lumps, it requires less power than is required to compress square ones of the same weight, as there are no corners to fill and, as a result, less friction. With round or egg-shaped lumps, no matter what amount of coal is piled on the fire, there is always sufficient space between the lumps to secure a good draught, and to allow a free access for a good supply of oxygen.

For these reasons I have adopted the egg-shaped form, slightly flattened, and have modified Baudry's and Martin's presses, in order to obtain more and better products. Instead of using moulding rollers producing only *one* lump at a time, I increase the length of the rollers, and mould fourteen lumps at a time. The feeding is regulated by a pug-mill, with a central shaft, to which a series of knives is fastened at any required angle, and below these knives, on the same shaft, is a two-bladed propeller. The bottom of this mill is formed by two sliding-plates, which can be brought apart and together by hand-wheels. I am thus enabled to increase or reduce the open space between them, and to force more or less plastic material between the rollers, according to the degree of moisture which it possesses. The number of revolutions of the knives can also be increased or reduced, by changing one gear wheel, which can be done in a few minutes. A machine is thus obtained, possessing all the good qualities of Baudry's press, and having none of its defects. The lumps fall on an endless wire-cloth belt, and are carried by it directly into the drying-oven. This press will produce over 10 tons per hour. The drying of the fuel, in Europe, takes place in ovens.

In this system all handling is suppressed. No cars, tracks, hooks, turning-tables, &c., are necessary. The doors of the oven are always closed, and consequently the heat in the oven can be kept up to any degree; the iron in the oven is not liable to contraction and expansion, and less coal is consumed to dry the manufactured fuel.

To render the fuel impervious to moisture, instead of mixing a resinous substance with the materials, the lumps are simply dipped into a liquid composed of rosin dissolved in crude benzine. By exposure to a current of air the benzine evaporates, and leaves each lump coated with a thin film of rosin, which closes all the interstices and renders the fuel waterproof. I have kept lumps under water for three months.

CONCRETE BUILDING.

CIVIL AND MECHANICAL ENGINEERS' SOCIETY.

AT the meeting of the members of this Society held at their rooms, No. 7, Westminster-chambers, Victoria-street, on the evening of Friday, the 13th inst., under the presidency of Mr. C. H. Rew, a paper on "Concrete Buildings" was read by Mr. Drake. He said that to trace the history of the use of concrete for structural purposes would take the student back to the earliest period of the world's history. Both in India and in America concrete had been used from the earliest times, and in every country in Europe old concrete buildings were numerous. With such facts, it appeared strange that only about fifty years ago the use of concrete, even for foundations, had almost ceased in this country. The modern revival of its use could be easily traced to the increased knowledge of the properties and values of all kinds of limes and cements; engineers, architects, and manufacturers recognising the necessity of applying the most accurate scientific knowledge and practice to the preparation and use of these materials. In tracing the progress of this country in the use of concrete, it was stated that Mr. W. Ranger, of Brighton, obtained, in 1832 and 1834, patents for "artificial stone," his patent specifications describing careful and scientific methods of making lime concrete blocks for buildings. In 1836 the first medal of the Royal Institute of Architects was awarded to Mr. G. Godwin for his essay on concrete, which was published in the first part of the first volume of the "Transactions" of the Institute; and to its influence he said might be traced very much of the increased use of concrete, especially for foundations. Capt. Smith's translation of M. Vicat's treatise on limes and cements was next mentioned. The rise and progress of modern concrete buildings was found to be co-ordinate with the discovery and perfection in manufacture of Portland cement. Roman and Medina cements were inferior in many ways to Portland cement for concrete-work, and when measured by strength, were very much dearer. Much of the high superiority of Portland cement was due to the careful and scientific tests and experiments of the engineer of the Metropolitan Board of Works, and especially to Mr. Grant and Mr. Bazelgette. Mr. Drake said, that in 1868 he obtained a patent for concrete-building apparatus, and that it had gained much favour. The advantages secured by the use of cement concrete for house-building purposes were,—increased strength, greater durability, reduced cost, greater expedition, superior damp-resisting qualities, greater facilities for fire-proof construction, greater facilities and economy for ventilating, warming, and applying improved sanitary arrangements, being vermin-proof, and giving an alternative method of construction and the means of employing unskilled labour. Mr. Grant's tests and Mr. Kirkaldy's accurate testing machinery had proved conclusively that

almost all the ordinary buildings of stones and bricks succumbed under test before concrete. The lowest estimate of comparative strength that he had seen showed concrete to be three times stronger than brickwork, there being of course a variation of strength with the different kinds of materials used for mixing with the cement. Chemical analysis proved that the durability of modern cement concrete was assured by its ultimate crystallisation; and the experiments of Mr. Grant showed that instead of deteriorating with age it became harder and stronger. Many of Mr. Drake's clients had testified to the reduced cost of the material, some stating the cost of concrete-work to be less than half the cost of brickwork, while others said there was a saving of from 30 to 40 per cent. The cost varied, as in some districts circumstances were much less favourable to concrete than in others. There were, even when carriage of cement and the aggregates for concrete were dearer, other elements of economy worthy of notice—wood lintels and bonds were not required, one coat of plastering could be saved, and the thinness of walls of concrete gave more house-room than would stone walls. Cement concrete walls might be safely built at the rate of 2 ft. high per day. The greatest saving of time effected by concrete-building was due to the fact that a concrete house was perfectly dry as soon as built, and might be inhabited at once with safety. During the progress of setting, which occupied only a few hours, cement exuded all moisture in excess of that required for hydration and induration, and would not again absorb moisture from the atmosphere. The non-absorbent qualities of concrete were considered by many to be its most valuable quality. Several instances were given to show that good cement concrete was practically damp-proof. Concrete offered greater facilities for fireproof construction than any other material. He had seen pieces of concrete taken red-hot from a fire, and upon cooling it showed no other effect than a slight vitrification of surface. Much depended upon the aggregate of which the concrete was composed. The chief cause of failure in many so-called fireproof buildings had been the use of iron, while in concrete floors and roofs were protected from the heat, as they were completely buried in the concrete. In concrete walls, ventilating and air-flues could be formed in the walls, and no pipes were required. In monolithic concrete houses there were no mortar joints, and vermin had no chance whatever of finding an entry or an abiding-place. The work in building with concrete could be done almost entirely by unskilled labour. For that reason, and because concrete offered an alternative method of construction, in conclusion he thought it ought, in these days of strikes and attempted restrictions of trade, to find favour with employers.

The chairman considered the members were under an obligation to Mr. Drake for his excellent paper. He had not, however, according to his (the chairman's) view, made out a case of decay in brick and stone. Stone would stand as long as concrete, if it was properly chosen at the first. While concrete might be suitable for engineering work for heavy foundations, it was totally unfit for any architectural purposes. He had seen some concrete buildings which had taken a very long time to erect, while he knew of some brick buildings which had been built and inhabited in four weeks.

Mr. Butler thought there was no doubt that concrete had a great future before it. To modern engineers he considered it due that Portland cement had been raised to its present value as a building material. The improvements in mortars and cements were almost of modern origin. In ancient work the Romans used very good mortar and cement, but afterwards it fell into disuse; and in England the Middle Age architects built with very bad material.

Mr. Pain differed from Mr. Drake as to the rapidity with which buildings could be erected, and gave an instance where a concrete building had been in hand a longer time than it would have taken to erect a brick building. In an architectural point of view he considered that it was a failure entirely. He hardly thought it fair to give examples of old buildings, and state that the concrete-work had stood for so many years, when perhaps there were a great number of buildings of the same material that had gone to ruin. There were equally good examples in brick and stone to be seen. If concrete-work was scamped, it was worse than brick or stone-work scamped. Doubtless it was a great advantage to use concrete when bricks or stone could not be obtained. In the construction of walls, warehouses, or other buildings where no architectural display was required, he thought it would be an advantage. Anything in the way of architectural decoration which he had seen in concrete buildings had been either cement mouldings or cornices, and the appearance was poor and wretched.

Mr. Whitaker supported several of Mr. Pain's views.

Mr. Wilcox said, as to the mixing of concrete some persons thought it should be thrown from a certain height; but he thought that was a disputed point; for where that was done the stones fell below, and a proper mixture was not obtained. This view was also supported by

Mr. Butler, who believed that the best way to use concrete was by adopting the old-fashioned block system.

Mr. Usill agreed with the two previous speakers as to mixing concrete, and the use of the block system.

Mr. Meakin thought the chief argument in favour of concrete as a building material was its cheapness. If a finer class of cement, or a finer quality of concrete, were used as a facing on buildings constructed with concrete, he thought that some little ornamentation might be impressed upon it. The plainness and unsightliness of structure would thereby be improved.

Mr. Drake, in reply to Mr. Pain, gave an explanation of the delay in the erection of the building to which that gentleman referred; and in support of his argument that concrete buildings could be very rapidly constructed, he said that an hotel, three floors high, which he had had to erect within six weeks under a penalty of 50*l.*, had been completed within five weeks. There was little or no difference between the brick-built and cemented house of the west of London and his concrete houses, which were also cemented. An explanation of the mode of mixing concrete was given. The various advantages of the use of the block system he considered as very delusive, and thought the time spent in setting them, waiting to see if they were secure, and the employing of skilled men, were all unnecessary. The concrete building apparatus was referred to.

CONVERSION OF HOTELS INTO WORKING MEN'S HALLS.

THE inauguration of a new style of hall—or rather the conversion of a first-class hotel—into a building for workmen's temperance meetings, took place last week, and is likely to be the precursor of similar buildings.

The city of Durham has of late become very active in the temperance movement; and the members having felt the want of a large place for public meetings, it was eventually resolved to bid at auction for the Shakspeare Hotel, which was in the market; and, despite the high biddings of distillers and brewers, the temperance advocates got the house knocked down for the sum of 2,630*l.* The property then required considerable alterations, and subscriptions ranging from 1,000*l.* to a penny came in from different parts of the county, that enabled the committee to commission Mr. Henry, architect, to prepare plans for the alteration of the property into the "Shakspeare British Workman," and the work of restoration was brought to a successful termination a few weeks ago.

The design was to make it as cozy and comfortable as an English hotel; and on the ground floor are the bar, a dining-room, and a smoke-room. The "bar" occupies the same position as when it dispensed grog, and measures 16 ft. by 13 ft., and the architect has embellished the walls with the old half-dozen spirit-casks, which have been cleaned, and painted, and purged of all spirituous chances of absorbing alcohol into the pores of teetollars.

The hall will seat about 300 persons, measuring 50 ft. by 29 ft. The height of the wall-plate is 16 ft. 6 in., and the total distance to the apex of the roof is 25 ft. The roof is trussed with circular ribs, and is ceiled from the wall-plate, and has a pleasing aspect. At the west end of the room is a platform, near to which are fixed an harmonium and a pianoforte; scullery, larder, and ante-room. There is a large boiler-house, for making tea and coffee on a heavy scale, and for boiling hams; stabling for horses; and above which is a lodge-room, for the use of temperance societies, friendly societies, and other kindred bodies. Inside the yard the manager has a compact residence, that will enable him to lodge visitors. Even the old sign-board is left swinging; but instead of "Good accommodation for man and horse. Best wines, spirits, and ales," the architect has been directed to have lettered,—

> "A publichouse without the drink,
> Where men may sit, read, talk, and think,
> Then safely home return,
> A stepping-stone this house you 'll find,
> Consent to leave your beer behind,
> And truer pleasures learn."

The total cost of the alterations was 1,400*l.*, which, with 2,630*l.*, the purchase-money, and the expense of the fittings, is nearly all subscribed.

THE KENNINGTON NEW BATHS AND PUBLIC HALL.

A NEW building which will contain one of the largest swimming-baths in the metropolis, as well as upwards of fifty private warm baths, and which is also so constructed as to answer all the purposes of a large public hall, has just been erected in Harleyford-road, Kennington, immediately opposite the Oval Cricket-ground, and the opening ceremony will take place shortly after Easter, when it is intended to have a number of swimming matches.

The Harleyford-road frontage of the baths, which is also the main entrance to them, forms the central elevation of a new block of houses, right and left of it, now in course of erection, and which overlook and have a commanding view of the cricket-ground. The elevation of the baths is carried considerably higher than the buildings on either side, and is surmounted by a gable. Underneath, an archway leads to the baths, which are approached along a corridor 16 ft. in width and about 100 ft. in length. The swimming-bath is entered at the extreme end of the corridor, whilst the approach to the private baths above is by a stone staircase on the right-hand side of the corridor, 6 ft. in width. The extreme ground area of the interior of the building, from wall to wall, and including the space around the margin of the swimming-bath, is 160 ft. in length, by 60 ft. in width, thus occupying nearly 10,000 square feet, whilst the dimensions of the water area of the bath are 127 ft. in length, by 37 ft. in width, with a minimum and maximum depth of 4 ft. and 7 ft. respectively. The bath is circular at each end, and steps formed of Portland cement are carried entirely round down to the bottom of the bath. Dressing-boxes, on the immediate edge of the bath are also fitted up around the entire water area. They are 92 in number, and are 4 ft. in length and 3 ft. in width, being entered at the rear from a corridor carried round the interior. In the centre of the bath, and 40 ft. from the shallow end, there is a fountain which is intended to be kept constantly playing. Above the swimming-bath a gallery or balcony is carried entirely round the interior of the building. This gallery is supported by 24 square columns, which are also carried up to the roof. The rear portion of the gallery will be partitioned off for the private baths, which will be 60 in number, whilst the front is intended to be fitted up with seats for the audience on the occasion of meetings or entertainments. The front of the gallery is of open ornamental ironwork, which, together with the columns and the interior generally, is intended to be artistically painted and decorated. The interior has an open circular timber roof, with a lantern-light above, carried the full length of the baths, and which also serves for ventilating purposes. The roof will be stained and varnished. The extreme height from the bottom of the bath to the apex of the lantern light is 50 ft.

Amongst the objects contemplated by the proprietor, in addition to bath accommodation, is a coffee, smoking, and reading room, and for this purpose two rooms, 28 ft. by 14 ft., are situated in immediate proximity to the swimming-bath, and are entered on the left side of the main corridor leading to the latter. They are intended to be handsomely fitted up for their intended purpose, and liberally supplied with the newspapers and periodicals of the day. In view of the building being used for meetings, dinners, musical entertainments, balls, or other public purposes, arrangements have been made for running off the water in the swimming-bath during the winter months, and converting the interior into a spacious hall, by laying down a floor, which, we understand, has been constructed for the purpose. Its capacity, including the galleries, is calculated to be equal to an audience of between three and four thousand persons, on occasions when it may be used for meetings or

other similar purposes; whilst the ground area will accommodate a dining-party of upwards of a thousand. The building is centrally situated in the immediate neighbourhood of Vauxhall, the "Horns," Kennington-road, Kennington-park-road, and other populous districts.

The building has been erected from designs furnished by Mr. Higgs, the owner; the works having also been carried out by Mr. Higgs, under the superintendence of Mr. Swain, as clerk of works.

NOTTINGHAM IN OLD TIMES.

THE history of Nottingham is obscure, but by the aid of charters and State papers, supplemented by other documents accessible to the public, we learn that from an early period Nottingham was a town of some importance, and the records in the muniment-rooms of the Corporation have long engaged the attention of antiquaries. In the local *Guardian* is an interesting article on this subject, to which we are indebted for the following particulars:—Edward I., in 1283, granted a mayor. In 1574 a list of mayors first appears in the Hall book, but the first nomination was 1594, yet there is no record of nomination before 1598, and no satisfactory evidence who chose the mayor until the 18th Elizabeth, and when the mayor first became Lord of the Manor is not known; but a Mickleton juries' presentment exists as early as 1512. Amongst other presentments, they say the market wall is in decay for want of coping stones, and forbid people to wind corn in the streets, or allow swine to roam without a swineherd. They also present that every alderman shall make search in his ward weekly to weed out idle persons, and all who let houses in back lanes shall be bound in a good round sum of money to discharge the town if they leave any children behind them. The chamberlain's accounts are curious, and date from Henry VIII. A few extracts may interest. In 1548 the so-called Robin Hood's Well is entered in the Hall book, as "Robyn Hood's Well." In 1586 no person was to go to Derby for 12 days, without the consent of the Mayor, and not to receive any Derby men under pain of 10s. In 1594 it was ordered that R. Hancock was to dig in the coppice for coal. In 1603 a proclamation was issued as to keeping Lent, and as to the sale of fish; white herrings full-roed three gallons 1d., white shotten four gallons 1d. Twenty years later, such was the distress around Nottingham that the justices report that dogs' flesh and horse flesh were dainty dishes; many soldiers were without shirts, shoes, socks, or breeches, and no money to pay them; many malt-houses and alehouses were suppressed, and the corn sold to the poor. In 1628 a proclamation was issued to Anthony Aier to preserve his Majesty's "game of hares," in the county of Nottingham. In 1647 the mayor's sergeant was ordered to close shops according to custom, and restrain non-freemen from trading. In 1652 tolls collectedo n oatmeal and malt shall go to the mayor's sergeants equally between them. In 1654 Evelyn in his diary says, "I lay this night (14th August) at Nottingham, and I observed an ample market-place, and large streets full of crosses." He would also observe an unpaved market-place, occupied by saw-pits, with a horsepond in the centre, an open sough and a mouldering wall down the middle, with rough timber on sale roped to trees, and stocks, pillory, and a ducking-stool on Timber-hill. In 1655 two persons are ordered to make a journey to Leicester to ascertain the best way to set poor stockingmakers to work, and a house was taken in Castle-gate for that purpose for two years. In 1685 it was ordered that burgess parts should be forfeited, if the recipients could not procure certificates of having received the sacrament within twelve months. Counsel's opinion was taken upon this subject, 1776, who decided that the sacrament must be received.

The Surveyorship of Marylebone.—There will be a very strong contest for the office of chief surveyor of Marylebone, the salary for which is 600*l.* per annum, at the meeting of the Marylebone Vestry this Thursday. At the meeting held last week five candidates were selected by a committee to go to a ballot, viz., Mr. George Buchannan, Mr. H. J. Hallett, Mr. A. Latham, Mr. J. Niblett, and Mr. Henry T. Tomkins. Mr. Latham and Mr. Tomkins having the highest numbers, will go to the final ballot.

A WORKING MEN'S CLUB-HOUSE BUILT BY WORKING MEN.

A WORKING Men's Club has recently been built at 93, Regent-street, Westminster, called the Portcullis Club, which has been completed in every respect by a body of working men. The ground upon which it stands has been purchased by working men, who also purchased and paid for the materials of which it has been built. The same parties have also actually themselves erected the building, having been employed on the work after leaving their regular day's labour, on many occasions until midnight. Beyond this, they employed no architect, one of their own body having drawn up the whole of the plans and elevations of the building, which comprises a large hall, which they let for lectures and musical and other entertainments. There is also a large reading-room, which is fitted up for writing and business purposes, and chess, draughts, and other quiet games are also played in this room. Another part of the building contains a billiard-table, and a refreshment-bar which is conducted upon temperance principles. The lecture-room has already been let on several occasions, and the refreshment-bar has also been placed in the hands of a tenant, who pays a rent for it which covers a certain portion of the expenses of the establishment, the tenant undertaking to supply the best materials at reasonable charges.

A NEW CEMETERY FOR HAMPSTEAD.

LAST week Mr. Holland, the medical inspector appointed by the Home Office, attended at Fortune Green, Hampstead, to inspect a site for a proposed new cemetery for the parish of St. John, Hampstead, which has become necessary in consequence of the burial-ground attached to the parish church being now nearly full. The result is that a Burial Board has been constituted by the Vestry, and the Board have selected a site twenty acres in extent, situated on the west side of Fortune Green Lane, and to the south of the Anglo-French College, Finchley-road. The inspector having examined the site, adjourned to the Cook and Hoop Tavern, West-end, where an inquiry took place as to the suitability of the site. The surveyor of the vestry said that the land could be easily drained, and made available as a cemetery, according to the provisions of the Burial Acts. The cost of the land would be 500*l.* per acre, but that, as it was copyhold, it would amount, with enfranchising, to about 600*l.* Three acres of the site being within 100 yards of some cottages, could not be used for interments without the sanction of the owners, and this portion the Board proposed should be planted as ornamental ground. The site was supported by Mr. Le Breton, of the Metropolitan Board, and several other gentlemen, and opposed, amongst others, by Mr. Haysman, proprietor of the Anglo-French College, on the ground that it was too near the populated portion of the parish; but it was shown, on the other hand, that it was at one of the boundaries of the parish, and in reality away in the country. The Government Inspector appeared to be of opinion that the site was unobjectionable, but eventually he adjourned the inquiry until the week after Easter, in the meantime throwing upon the owners of property who opposed the onus of finding a more advantageous site.

THE GREAT FORTH RAILWAY BRIDGE.

THE unprecedented magnitude of the proposed stupendous bridge across the Forth has so alarmed a number of the shareholders in the North British Railway, under whose auspices, along with the Midland Railway, it is intended to be carried out, that a committee of shareholders of the former company are taking steps to secure the election of a number of directors who will oppose the proposal for the North British Company to take an active part in the construction of the works. The committee state that the Act for the construction of the bridge incorporates a company with a share capital of 1,250,000*l.*, with borrowing powers for 416,666*l.*, a sum equal to the present market value of the North British ordinary stock; and that the authorised railways extend over a distance of about thirteen miles, in addition to the bridge across the Forth, which is one mile and a half in length. In aid of this project the North British directors have signed an agreement guaranteeing 7 per cent. on the outlay of 1,250,000*l.*, and the committee complain that, although no efforts have been made by the Forth Bridge Company to obtain the necessary capital, there is an intention to link it on to the North British Company, and that a guarantee is given to the Forth Bridge Company of 40,000*l.*, and also a further sum of 35,000*l.* out of the net revenue of the North British, which aggregate sum is to be increased to 87,500*l.* They add that this guarantee will be ruinous to the North British Company, and they point to the improbability of the works ever being successfully carried out, owing to their gigantic character. The bridge, they say, is to be constructed on a scale hitherto unknown in engineering experience, the main span being nearly one-third of a mile in length, and the pillars much higher than the top of St. Paul's Cathedral; an undertaking, therefore, of so gigantic a nature as cannot be otherwise regarded than a most dangerous and unwise entanglement on the part of the North British Company, and involving risks which ought not to be undertaken. In the meantime the Midland Company are warmly supporting the undertaking, and have guaranteed 15,000*l.* a-year in traffic; and it is said that the works are immediately about to be commenced.

RESTORATION OF ST. HELEN'S CHURCH, YORK.

A MEETING of the parishioners has been held in the vestry of this church to consider the best means of repairing and restoring the west front. It appears that subsidence caused by street drainage in Davy-gate has rent one of the internal arches, and otherwise injured the buttresses and windows at the south-west angle. On further examination the lantern turret which surmounts the centre of the façade was found to be so much decayed that it would be unsafe to leave it in such a dangerous position. Messrs. Atkinson, architects, York, produced plans of the parts requiring to be repaired and restored, together with an estimate of the cost, which amounted to about 600*l.* Archdeacon Hey, the vicar, was in the chair, and explained that owing to the parish being so small they were obliged to appeal to the public for aid in carrying out the work. Mr. Roper, Clifton Croft, having offered 300*l.* for rebuilding the turret in its present form, a subscription list was opened and subscribed to by the parishioners present, in furtherance of the other portions of the work. It is intended to proceed with the restoration as soon as possible.

GAS.

THE Commissioners appointed by the Board of Trade to revise the price and illuminating power of the gas supplied by the Imperial Gas Company have made their award, fixing the illuminating power of the gas for the year 1874 at 14 candles, and the price at 4s. 8d. per 1,000 cubic feet. The increased price asked by the company was 1s. 1d. per 1,000 cubic feet. The Commissioners have allowed them 11d. per 1,000. The illuminating power remains as before. We should think the company must regret that they did not ask twopence more at least, when they would have no doubt got exactly what they wanted. The Chartered Company know a little better what they are about.

At the opening of the Commission on the application of the Chartered Gas Company for increase of rate, Mr. Serjeant Sargood stated that the accounts of 1873 indicated that there would be a *deficiency* on the current year of 289,648*l.*, or about 1s. 5½d. per 1,000 feet. It was proposed to ask for an increase of 1s. 4½d., which would still leave a deficiency of about 4,000*l.*

In consequence of complaints by the inhabitants of Notting-hill about an offensive discharge of refuse from the Gas-Light and Coke Company's works into the public sewer, the Vestry of the district took out a summons against the company at the police-court. Mr. Besley argued that the prohibition of refuse did not apply to liquids. On the merits of the case he said it was only a question of time, as the company were doing all they could to comply with the requirements of the Vestry. The hearing of the summons was adjourned.

Damage to Sharpness Docks.—The north wall of the new Sharpness Docks, 60 ft. long and 40 ft. high, has been broken down by the water recently let into the dock. The damage is estimated at from 40,000*l.* to 60,000*l.*

THE NEW COLLEGE AT NEWINGTON.

THE new building at Newington, called the Pastors' College, adjoining the Rev. C. Spurgeon's Tabernacle, which has been in course of erection during the last six months, is now approaching completion. During the present week the structure has been covered in, and workmen are now busily engaged in finishing the interior.

The style of architecture adopted is a mixed Gothic, and the materials used are red Farnham brick, with black brick bands and Portland stone plinths and dressings. The principal elevation is to the north, facing Temple-street, at the east end of which the building projects 8 ft. beyond the main body of the elevation. The length of this portion of the elevation is 35 ft., terminating with a gable, the extreme height of which is 58 ft. In continuation the elevation is carried westward 59 ft., the entire length of the frontage being 94 ft. The west frontage is hexagonal in form. The main body of the building is 36 ft. in height to the cornice, and 60 ft. to the ridge of the roof, and contains a lofty ground-floor, and an equally lofty upper floor. This was the original plan, according to which the building was intended to be erected, when the works were commenced last autumn; but subsequently an extension of the building was decided upon, and the structure is now carried up, in the centre, over the first-floor, to the extent of another story, which not only gives increased internal space and accommodation, but also imparts additional effect to the architectural appearance of the exterior. This extension of the original design has increased the cost of the building to the extent of nearly 2,000*l*. The principal entrance to the building is in the projecting portion of the north elevation, and is recessed, its width from pier to pier being 11 ft. In the centre of the gable in the upper floor there is a large traceried three-light window, 16 ft. in height and 8 ft. in width, the other portion of the upper part of the elevation containing four three-light traceried windows, 6 ft. in height and 8 ft. in width. The windows in the ground-floor are also uniform in their architectural character and dimensions with those above, but not traceried. The roof of the main body of the building is covered with green slates. The central portion of the building, above this, already named, terminates with an octagonal lantern-light, 21 ft. in width, the height of which from the ground-floor is 74 ft.; whilst at the east and west angles of the lantern-light there are octagonal ventilating shafts or turrets, 6 ft. in diameter and 25 ft. high, their extreme altitude from the ground-level being 80 ft. These ventilating turrets have stone copings, surmounted by open ironwork, for ventilating purposes.

The ground floor contains the college common room, 43 ft. by 28 ft., together with a large room, 71 ft. by 32 ft., which it is intended to divide into three class-rooms by movable partitions, thus admitting of the apartment being at any time converted into one large room for meetings or any other purpose. There are also three other class-rooms in the rear of this floor, in addition to two curators' rooms. An iron and stone staircase leads up to the first floor, which contains a large hall, uniform in its dimensions with that on the ground floor, namely, 71 ft. by 32 ft.; at the east end of which there is a gallery, approached from the landing on the third story in the centre of the building. This apartment is 28 ft. in height to the upper portion of the ceiling, which is of timber, stained and varnished. Adjoining this is an apartment, octagonal in form, and 30 ft. in diameter, which was originally intended for the library, but which is now to be converted into a depôt for the sale of books in connexion with the tabernacle and the college. At the south-east corner of this floor is the lecture-room, an apartment 45 ft. 6 in. by 28 ft., with a raised angular platform at the west end, and immediately adjoining the lecture-room are four class-rooms, 24 ft. by 15 ft. each, together with offices and other apartments. The library is in the third floor, immediately over the octagonal apartment below, with which it is uniform in form and dimensions, and is lighted from the lantern-light at the top of the building. The floors are double and 2 ft. in thickness, including the iron girders and joists. The whole of the building will be heated and ventilated on Haden & Son's principle, the machinery for which is in the basement, and flues in the walls throughout communicate with the ventilating shafts already described.

The architect is Mr. Henry Currey, and the builder Mr. Brass, and the cost of the building is stated at 11,000*l*.

SANITARY AND EDUCATIONAL EXHIBITION.

AT the last meeting of the Executive Committee of Council of the Social Science Association, it was resolved that an Exhibition of Sanitary and Educational Appliances, such as that at Leeds in 1871, and at Norwich last year, during the period of the Congress in those places, should be organised to take place in connexion with the annual meeting of the Association, to be held in Glasgow in the autumn. In furtherance of this object, a Managing Committee was appointed to make the necessary arrangements. The object of the Exhibition is to bring under the notice of the public generally, and particularly those who are interested in social, sanitary, and educational questions, the latest scientific appliances for improving the public health and promoting education. Among these may be mentioned all matters relating to architectural and sanitary engineering, warming and ventilation, heating and cooking, water supply, sewage and drainage, food, disinfectants, hygiene in clothing, and things relating to the prevention of disease; school furniture, and other articles used in teaching; and all sorts of appliances appertaining to the advancement of sanitary science, the promotion of education, and the improvement of the health and domestic comfort of the community at large.

SUITABLE HOUSES.

IN the last report on the condition of the Whitechapel district, Mr. John Liddle says, under the heading, *Metropolitan Board of Works*:—

"The best plan of improving the densely-crowded localities which presents itself to my mind is, for the Metropolitan Board of Works to obtain powers for the compulsory purchase of lands and houses which are unfit for habitation, and sell the ground, either to private individuals or public companies, for the purpose of erecting suitable houses for the use of the working classes, according to plans prepared by their surveyor, and approved of by the Board.

So long as the poor are suffered to remain huddled together in the several narrow courts and alleys in London, as is now the case, into which no other persons, except the police, relieving officers, medical officers of the union, and sanitary officers, enter, little or no improvement can be expected to take place in the moral, physical, or intellectual condition of the people. It is necessary for the well-being of a community that the rich and the poor should live in accessible proximity to each other, and should not be separated in the manner they now are in London,—the wealthy occupying the wide thoroughfares, and the poor the bye and narrow places on each side of them, so as to be out of sight, and, alas! too frequently, out of mind. So long as this state of things exists, the poor and ignorant have little prospect of becoming improved. Whereas, if the habitations and localities of the poor were thrown open to public view, by widening some of these confined places, the inhabitants thereof would profit by the example of their richer brethren. Much has recently been done in Glasgow, under the powers of the renewed Improvement Act, 1871, which enable the Lord Provost, magistrates, and council of the city, for the purposes of this Act, to take houses and lands compulsorily to make new streets, to alter old ones, to purchase lands and houses by agreement, to erect new buildings, to dispose of land by lease or fue for building purposes, &c. By these powers, the authority have extirpated seats of contagious fever, and have greatly improved the moral and physical condition of the people; and this has been done without inflicting any suffering upon the poor."

An Engineer for the West Indies.—The Borough Council of the Port of Spain, Trinidad, West Indies, in reply to their advertisement, received 125 applications for the post of engineer and surveyor to their town, and have conferred the appointment upon Mr. Llewellyn Lloyd, C.E., Oxford, at a salary of 600*l*. a year, and private practice allowable.

EXTERNAL AIR TO FIRE-GRATES.

AN architect, "F. W. S.," writing as to some recent claims to credit for introducing the external air beneath the fire-grates, points out that it was long ago advocated in the *Builder*, and that he himself introduced air to grates many years ago. There is nothing new in the idea; the difficulty is to do it efficiently. In towns it seems undesirable without filtration, because of the dirt it otherwise introduces. The writer says,—"In a house in Brighton, where I bring in the external air, it is introduced at the back of the kitchen-range, and passes from thence up a flue to the foot of the staircase, which it thoroughly warms, and this is effected without the additional cost of 1s. for fuel.

One of the principal reasons why the majority of English houses are so miserably chilly in winter (in which, I believe, a Russian would perish of cold) is that the staircases and passages are kept at a *lower* instead of a *higher* temperature than the rooms, so that when a door is opened the cooler air rushes from the staircase or passage into the warmer apartment, towards the fireplace, and thus creates those dangerous draughts which destroy our health and comfort.

In a visit I made to Moscow a year or two ago, whenever I felt cold in my sitting-room, I used to go and sit in the passage or staircase, for the sake of warmth. If our houses were arranged in a similar manner, we might have health and comfort comparatively without cost."

A PERSPECTOGRAPH.

MR. A. R. EAST, of Selma, Indiana, has patented an improved perspectograph, the object of which is to provide a simple and efficient mechanical apparatus by which to take the points or boundary-lines of all visible stationary objects accurately, and transfer them to paper on a sketch-board. According to *Iron*, this is done by two perpendicular bars, which extend from a bed-piece. On one bar are two sleeves, the lower of which carries a horizontal arm, the further extremity of which is slotted to receive the second perpendicular bar. On the horizontal arm slides a vertical rod, through which, at its upper end, passes another horizontal arm, which is attached to the upper sliding-piece on the bar first mentioned. Pivoted to either sliding-piece at will is a converging arm, which carries one eye-plate on a vertical staff. On all these portions, except the swinging arm, are marked scales. A single example of the mode of using the instrument will suffice to show its application. To operate by the use of the perpendicular scale and the horizontal scale on the upper sliding-piece, or, in other words, to take field notes by latitude and departure, using the sliding scales, slide the horizontal scale to the top of the meridian, and move the scale of latitude (the vertical rod on the lower horizontal arm) to the extreme right. An object in the foreground to the extreme left, and nearest to the observer, is selected and regarded through the eye-plate. The scale of latitude on the base is next moved till it comes in direct line with the eye and the said point. Then the horizontal scale at the top of the meridian is loosened and moved down till it also comes in direct line from the eye to the object, and the angle of incidence, or the latitude and departure of the point of the object is found at the intersection of the two scales. A horizontal scale on the plat-board is moved until it cuts the degree of latitude of the point in the object, and a dotter is fixed to the angle of longitude or departure. By a gentle pressure on the dotter the point is carried on the paper. In this way the operation is carried on from object to object, and from point to point, until the entire field is gone over.

SNETTISHAM SCHOOL COMPETITION, NORFOLK.

SIR,—I have been informed on reliable authority that the selection in this competition has not fallen upon an architect, but upon a builder's clerk in the neighbouring town of Lynn.

Far be it from me, sir, to underrate the abilities of this gentleman (who, for aught I know, may be thoroughly competent), or to impugn the judgment of the School Board, whose business it was to adjudicate upon the relative merits of the designs of the architects whose services they solicited. Yet how frequently does it happen in these competitions, that, though the four quarters be ransacked for plans, the choice, after much ponderous debate, falls upon some unprofessional neighbour, whose eclectic attainments are probably not of the highest order.

AN ARCHITECT.

THE LUMBER TRADE.

THE mild winter has been very bad for logging in many parts of Canada. The *Morning Chronicle* of Quebec says:—

"Matters are even worse in the Michigan peninsula. In the latter district, owing chiefly to the money crisis, manfacturers were unable to make preparations for more than one-half of their usual get-out, and it is feared that that half will now be diminished by fully one-third to one-half, owing to the want of snow and frost. We understand that as a consequence the lumber market of the United States is appreciating the state of affairs, and we hear that lumber has gone up fully one dollar the mille feet, in Chicago.

We learn that many of our Canadian friends, who have been as usual going into Michigan to get out oak and elm square timber, and oak staves, have been very unfortunate, owing to the difficulties they had to contend with; most of them have reduced the number of their hands many weeks ago, as there was no advantage in chopping down what it was almost certain could not be hauled to the banks."

DRYDEN'S POETIC PROPHECY OF EDINBURGH.

SIR,—Seeing that visitors and strangers who come from afar to build and to sojourn in Edinburgh, give vent to their feelings against those who, in their haste to be rich, would obscure rather than develop the charms of a city beautiful for situations, I think the following lines by Dryden may now tend to keep our architects and builders on the alert to add to, instead of detracting from, the beauty of Edinburgh:—

"Now like a maiden queen she will behold
From her high turrets hourly suitors come;
The East with incense, and the West with gold,
Will stand like suppliants to receive her doom.
The silver Forth, her own domestic flood,
Shall bear her vessels like a sweeping train,
And often wish, as of her mistress proud,
With longing eyes to meet her face again.
The vent'rous merchant who design'd more far,
And touches on our hospitable shore,
Charm'd with the splendour of the northern star,
Shall here unload him, and depart no more."

It is passing strange that it is from the palatial homes of those who have settled here that this remonstrance comes against those citizens who, for a little gain, would so far sacrifice the amenity of part of the city, sloping towards the Forth, north of the Dean Bridge. Luckily, the varied levels of the ground in and around Edinburgh hinder much damage from being done to the general grandeur of appearance that the city possesses when viewed from a distance. Still it is a pity to see the haphazard way in which many vistas and views have been neglected, or, at least, the bravery of effect diminished, when the beauty of the whole surrounding prospect might have been increased at the same cost for buildings adapted to the respective sites.

J. K.

ANCIENT EDIFICES.

SIR,—In the year 1873 I saw in the West-street of Hexham, nearly opposite the Wesleyan chapel, two very curious old houses, which merit the notice of architects. On the Roman wall, the stations of Housesteads and Birdoswald, and west of Carlisle, old Dacre Castle satisfied my expectation. Even in busy Manchester some old buildings are extant, and many at Congleton. At Lichfield I saw the corner house in the market-place, occupied by Dr. S. Johnson's father,—a grocer's shop in 1797, when Miss Burney saw it, "stuccoed, with five sash windows in front, and pillars before it," engraved in Croker's original edition of "Boswell's Johnson," and in an anonymous account of Lichfield, A.D. 1819, printed by Lomax, of Lichfield, p. 145, as it was in 1760. Since then the ground floor has been altered. At p. 152, the house of Mrs. L. Porter, Dr. Johnson's daughter-in-law, is engraved. I saw at Edgell, two miles south of Lichfield, the large house, engraved in "Harwood's Lichfield," 1806, p. 564, and there stated to have been Dr. Johnson's academy in 1736. It is called "Dr. Johnson's house" in the village. In "Erdeswicke's Staffordshire," 1844, and in the volume printed by Lomax, this house is stated to have been demolished. It has been altered, and the observatory has been removed; but the house can be identified by the windows in the roof, the willow at the south-east corner, and the back gable. On the east side of Boar-street, Lichfield, is an ancient house, of the time of Queen Elizabeth, I think.

CHR. COOKE.

"BRIDGES AND CULVERTS."

SIR,—The question raised by "County Surveyor" some time back engaged the attention of the Bridge Committee for the county of Essex, and I was directed as County Surveyor to give my view of the matter.

It seemed to me that the term "bridge" for county purposes was applicable to constructions—culverts or otherwise—carrying the high roads over natural streams, however insignificant they might be; that the term "culvert" applied to drains, of whatever construction, to assist in clearing the roads and ditches from water due to rainfalls or storms. Upon this view of the matter the Bridge Committee has acted.

HY. STOCK.

FIRE.

SIR,—A lively interest is manifested to prevent fires. Our leading fireman has been experimenting on a burnt post. He decides that there is nothing "like wood" to resist conflagrations, and hopes that it may be treated in some way to retard ignition. Something may be done to aid, but perfection may not be reached any more than the North Pole. Pickled timber has been offered to the trade, but invitations and extras are not liked. If beams, rafters, &c., were washed with a sized solution of soda or alum, or salt of any kind except saltpetre, not excluding our old enemy, Epsom salts, its application would be easy, inexpensive, and lasting. Its merit may be tested on a small scale at the small outlay of one penny; or thin slabs of alum, &c., might be laid or glued on the beams: heat would cause it to melt and run around the beams. The same might be applied for centre ceiling ornaments, upper mouldings, and so on.

R. T.

FROM SCOTLAND.

Edinburgh.—A portion of the bronze equestrian statue, designed by Mr. John Steell, R.S.A., as the leading feature of the Edinburgh Prince Consort Memorial, has been cast at the sculptor's foundry, in Grove-street. The monument, of which the red granite pedestal now stands complete in Charlotte-square, comprises, besides the mounted figure of the Prince, four bas-reliefs, to be let into panels of the pedestal, and four subsidiary groups of statuary, which will occupy projecting stages at the corners of the basement. The minor groups, as also the bas-reliefs—with, says our authority, the *Weekly Scotsman*, one exception,—have been in the bronze for some time, so that the work now remaining to be done is mainly the casting of the central subject, to which the artist has devoted much time and labour. Mr. Steell's original intention had been to dispose of this in two, or at most three, operations; but, on mature consideration, it was thought desirable still further to sub-divide the work rather than run any unnecessary risk by taking too much at a time. Accordingly five distinct castings were resolved upon; and one of these, embracing the fore-legs and chest of the horse, was successfully carried out a few days ago. That last undertaken was a much heavier piece of work, comprising the horse's head, neck, upper portion of fore-quarters, and barrel to a point below the saddle. The next will consist of the hind-quarters and hind-legs of the horse, and the figure of the rider will then be disposed of in two castings; after which the sections will be fused together by placing them in close juxtaposition and running molten metal along the edges. So far as could be judged from external appearances, the operation seemed perfectly successful.——The committee entrusted with the collection of subscriptions for the memorial of Sir James Y. Simpson, have decided to have a bust of the deceased baronet placed in Westminster Abbey, in addition to the statue by Mr. Wm. Brodie, R.S.A., which is to be erected in a central locality in the New Town. The balance of the subscriptions, amounting to nearly 2,500*l.*, will be handed over to the directors of the Edinburgh Royal Maternity Hospital, on condition that this sum shall be increased to 5,000*l.*, the whole to be devoted to the building of a new hospital with which the name of Sir James Simpson shall be in some way connected. Our authority, the *Weekly Scotsman*, says that the directors of the Maternity Hospital have at present 1,000*l.* in hand, and that an appeal will shortly be made to the public, in order to make up the necessary amount.——The Heriot's Hospital governors have just acquired the Lancastrian schools, Davie-street, which it is their intention to demolish, says a correspondent of the *Weekly Scotsman*, in order to erect upon the site a handsome new building, to meet the requirements of this populous and somewhat destitute neighbourhood. The proposed school will be two stories in height, and will partake of the architectural characteristics of the parent hospital. At the intersection of Dean-street, with St. Bernard's-crescent, a strip of land has also been acquired, upon which it is intended to build an infant school for the Stockbridge district. This latter structure, which will only be one story in height, will closely resemble in design the school which at the present time is in course of erection at Norton-place, and will be an agreeable architectural feature in the locality. Building operations in both cases are to be commenced forthwith. The elevations for both schools are in process of preparation by Mr. Chesser, architect.

Leith.—At a special meeting of the Leith Dock Commission, the contractor formerly accepted for the new dock having declined to accede to the terms of the Commission, the contract has now been given to the contractor for the Albert Dock, viz., Mr. William Scott, who will commence the works forthwith.

SCHOOL BOARD SCHOOLS.

Leicester. — The completion of the King Richard's-road Board Schools has been celebrated by a public gathering, in which the Mayor and others took part. The schools are intended to provide accommodation for about eleven hundred children. They comprise four departments, viz., schools for boys, girls, and infants, and one for mixed scholars. Each of these departments has an equal area floor-space allotted to it, and consists of an L-shaped school, of which one arm of the L is 57 ft., the other 34 ft. long; two class-rooms, each 20 ft. by 18 ft., and separate entrance lavatory and out-offices. The width of the schoolroom in each case is 18 ft. The clear height of all rooms on the ground floor is 14 ft., and of those on the first floor 17 ft. The exact numbers which the several departments of the school will accommodate are as follows:—Boys' school, 280; girls' school, 280; infants' school, 280; total 1,120. The allowance of superficial area for each child is 8 ft., and of cubical area about 150 ft. The infants and mixed scholars are located on the ground floor of the building; the boys and girls on the first floor; the boys and infants occupying the portion of the building nearest to, and the girls and mixed scholars the portion furthest from, the King Richard's-road. The total area of the site is 2,249 square yards. Of this area about 1,000 yards are occupied by building and fences, and the remainder is devoted to playgrounds for boys, girls, and infants. Each playground is distinct from the others, and those for the boys and infants are in front, that for the girls being in the rear of the buildings. The style adopted for the schools is Gothic, but the buildings are of the plainest possible description, and they are built entirely of red brick, the instruction of the School Board committee having been peremptory that stone work was not to be used, and that no ornamentation of the buildings would be permitted. The architects appointed by the School Board, Messrs. Shenton and Baker, have endeavoured to carry out the wishes of the committee as far as possible in these respects, and the work has been executed under their superintendence by Mr. Thomas Bland, whose contract amounted to 6,170*l.* This amount is exclusive of the cost of school fittings and stoves, and these items, together with the value of extra works sanctioned by the committee, will probably raise the total expenditure on the buildings to about 7,000*l.* The sub-contractors for the various works were: Mr. Yates, stonemason; Messrs. Cort & Paul, ironfounders and smiths; Mr. Shardlow, plumber and glazier; Mr. King, painter. The sanitary fittings are supplied by Messrs. McFarlane & Co., Glasgow.

Tannington, Suffolk.—At a meeting held to open tenders for the proposed new buildings, the following were laid before the Board by the architect, Mr. J. B. Pearce:—Messrs. Carter & Son, Saxmundham, 896*l.*; Mr. Wright, Norwich, 798*l.*; Mr. Grimwoode, Weybread, 785*l.*; Messrs. Goodman & Mallows, Framlingham, 708*l.* 10*s.* The last of these was accepted, subject to the approval of the Education Department.

SOCIETY OF LADY ARTISTS.

UNABLE again to obtain the Gallery in Conduit-street, the lady artists have found a home at 48, Great Marlborough-street, Regent-street, where two well-lighted apartments enable them to display 592 works, including three pieces of sculpture and three paintings on china. It is to be hoped the society will be able to remain where they now are, so that the public may know where to go. The larger gallery of the two is devoted to water-colours, the smaller to oil paintings and the list of contributors includes Mrs. E. M. Ward, Miss F. Ward, Mdme. Bodichon, Miss Florence Caxton, E. V. B., Miss Alice Manly, Mrs. Bridell Fox, Mrs. Benham Hay, Mrs. Marrable, who makes a successful *début* in oils, Miss Julia Pocock, Miss Rayner, the Misses Swift, Miss Rebecca Solomon, Miss Thornycroft, Miss Warren, and other known artists. Even admitting that our female painters send their best works to the Academy and elsewhere, as they have every right to do, this Society, which serves as a training-ground for recruits, has this special value, that it affords an opportunity to ladies with artistic ability to add in an agreeable manner to their possibly small means; and on that ground, not to mention others, deserves the support of the public.

SWANSEA STREET IMPROVEMENTS.

THE street tramways promise to bring about a change in the streets of Swansea, says the *Cambrian*. Mr. John Buse, of Oxford-street, has remodelled the corner of Temple-street and Goat-street. On that site stood the old police station. The corporation thought it best to remove the business of the police-court to the Guildhall, and erect a police-station in High-street; and the town is recompensed by having in its stead a block of buildings, erected at some cost, and which will be for the future known as the Temple-buildings. The block, which is now completed, consists of five first-class business premises and houses, two in Temple-street and three in Goat-street, which are erected on modern principles,—attention having been paid to sanitary requirements,—under the superintendence of the architect, Mr. Thomas Davies, and Mr. E. Cousins, the corporation surveyor, Mr. David Morgan being the builder. The building is four stories high, the rooms on each floor are lofty and well ventilated. The frontages in Temple-street and Goat-street are ornamental. The pillars of the ground floor are made of dressed stone, with carved Bath stone caps. The first floor frontage is built of dressed stone, with Bath stone columns and heads and cills of windows; the other floors being entirely of Bath stone with dressed stone quoins, having five gables of an ornamental design, with gilded spires. The shop-fronts are fitted up with plate glass; and the whole of the woodwork is varnished pitch pine. The pavement is carried round on an easy gradient, in lieu of the old and dangerous slopes.

THE POSITION OF THE INSTITUTE OF ARCHITECTS.

SIR,—All true friends of the Royal Institute of British Architects must have welcomed the few remarks you appear to have been constrained to make last week in reference to the late unfortunate suggestions of a Finance Committee. It is proposed to augment the entrance-fees of the members in general, and the yearly subscriptions of the Fellows in particular. Instead of four guineas per annum, the latter are invited to pay five guineas; and nothing is offered them in return but the gentle reminder that life is more expensive than it used to be, and that, the price of labour and materials having risen, architects' incomes have increased also. At the Institute itself labour, which used to be gratuitously performed, is now paid for as it should be; but the total amount expended upon salaries of officers is not very much less than half the yearly receipts for entrance-fees and members' subscriptions. When, however, it is remembered that the usual work of the council and other honorary committees consists principally in endorsing suggestions and sanctioning whatever has been "cut and dried" beforehand by one or two who have looked into the matter, any change tending to substitute honorary for paid assistance is scarcely to be recommended.

The Institute, however, is in debt to itself,—funds intended exclusively for the library have been employed for general purposes; and this debt must be paid with interest without further delay. It is imagined by the Finance Committee that, contrary to all known statistics, income can be increased by simply increasing the subscriptions—by imposing voluntary direct taxation. It is felt by many that a reduction of expenditure is possible, and that at least a hundred guineas can be saved by discontinuing the annual *conversazione*. But would not this savour somewhat of meanness? It would be infinitely better to leave the amount of fees and subscriptions as they are, and boldly inaugurate a diploma or certificate, which each Fellow of the Institute might receive upon payment of a certain sum of money. There are at present more than 275 Fellows, and supposing one hundred of the number consented to pay ten or even five guineas, a sum more than sufficient to meet emergencies would be obtained. In the course of a year, or two years, the grant of such certificates might be made dependent upon successfully passing an examination, conducted by a committee, not entirely professional, approved by the members, and subject to the approval of the State. Undoubtedly, for a short time, the world would be able to say that anybody, after having been seven years in professional practice, can obtain an architect's diploma by simply paying for it; but the same insinuation has been applied to many an admirable reform commenced under similar circumstances. It is necessary to make a beginning, and an accomplished fact usually receives in this country the respect everywhere accorded to success.

A FELLOW OF THE INSTITUTE.

ARCHITECTS' ACTIONS.

"PUGIN v. MOLLOY."

SIR,—It is not only not customary, but also most unprecedented, for an attorney to make statements regarding his client's case whilst it is still *sub judice*. It is therefore with considerable surprise that we have read Mr. Ryan's (the defendant's attorney) letters in your columns.

Such a course might possibly have been pardonable had a false statement been made, or had he believed himself to be in a position to give a true for an untrue one; but it is clear on the face of Mr. Ryan's letter that he is not in this position, and that his communication is intended to raise a quibble, and disguise the actual points at issue.

Although the report you first published gave the facts of the case rather than the incidents of the trial, still we would ask the defendant's attorney whether or not he is prepared to deny that our client was willing, on the ground of a long-standing friendship, to accept the sum of 80*l.* in full of all claims, and to take upon himself the loss of 630*l.* which had been incurred in the work!

If the defence did not depend on a point of law, on what did it depend?—for what other object was our client forced to take the case into open court?—for what object have costs of over 1,000*l.* been incurred if not in the hope and with the object of obtaining a verdict on a point of law? Not only do the facts speak for themselves, but the very expression was reported in Mr. Ryan's own words; and if this defence was not relied on in court one would assume it was simply because the defendant was, at the last moment, ashamed to rest his case on as rotten a foundation.

It is now more than two years and a half since our client, after making the generous proposal above referred to, offered to leave the whole question to any impartial tribunal, and on three different occasions proposed that the Right Rev. Dr. Ullathorne, of Birmingham, should be sole referee. These proposals having failed, our predecessors endeavoured to get the matter referred to a barrister or to one of the Masters, but every obstacle was thrown in the way by the defendant.

With regard to the Judge's ruling as to Mr. Pugin's being entitled to receive the difference between the specified quantities and the value of the work actually done, we are quite content to await the final issue. Mr. Molloy rests his case on an alleged contract for a specified sum, and, on his own showing, has failed to keep the terms; so far, therefore, the action is, and must be, practically undefended, and, under that assumption, it is clear the terms of the reference give the costs to the plaintiff.

As to the question of compromise, if a direct offer to settle on terms would lead to one, such an offer was most certainly made to and refused by the plaintiff in the words set forth in the report. Mr. Ryan's denial of the complimentary remarks made by the judge is too ludicrous to admit of serious consideration.

Mr. Justice Brett still lives, and we assume that the jury and the public who were in court have not ceased to exist. Begging you will kindly insert the above in your next issue.

JOHN BUTTON & CO.

*** With this the correspondence must end.

Wakefield Model Lodging-house Company (Limited).—A general meeting of the shareholders in this company was held at the Model Lodging-house, Wakefield, on Thursday, under the presidency of Mr. Henry Lee, chairman of the company. The report showed that the undertaking, commenced some fourteen months ago, had been a great success, so much so that the directors now recommended that a dividend at the rate of 10 per cent. per annum be paid for the past six months, leaving a small balance to be carried to the reserve fund.

CHURCH-BUILDING NEWS.

Reading.—The Reading School Chapel has been opened for divine service by the Bishop of Oxford. The architect is Mr. Waterhouse. The details of the work have been carried out under the direction of Mr. J. Bottrill, the clerk of the works. The chapel has been erected in the school grounds, a little to the west of the main building, under the superintendence of Mr. Waterhouse, who is the architect of the schools, in a style in harmony with that of the principal structure. Internally, the chapel is 88 ft. long by 26 ft. wide, and 42 ft. high to the apex of the roof. Over the ante-chapel, at the west end, is a gallery intended for the families of the masters, the floor of the chapel being devoted to the boys, the masters, and visitors. The seats are arranged college-fashion, parallel with the central passage, which runs from the ante-chapel to the altar-rail. At the west end are four stalls for masters on either side of the entrance, and other stalls are arranged in the back row of the ordinary seats. The chapel, externally, is erected of red bricks, with grey bricks in bands and diapers. Internally, the grey brick predominates, relief being given by dressings of red brick. No stone has been used in the construction of the building, nor any plastering internally, except a cement dado behind the seats. The curved principals of the roof recal the usual form of hammer-beam construction, while slender and delicately-moulded tie-beams have been inserted to prevent their exerting a thrust upon the walls. That part of the roof over the two eastern bays has been boarded to follow the curve of the principals, and the construction of the rest is visible up to the apex. The roof timbers are to remain unstained and unvarnished, just as they left the carpenter's hands. The seats will be varnished. The chapel is warmed by Messrs. Haden's system of warm-air circulation, the apparatus being placed in a vault below the vestry. Above the vestry, with its front to the Chapel, an organ will be erected by Mr. Hedgeland (we believe), the case of which will be designed by the architect, in harmony with the rest of the work. The windows are filled with tinted quarry-glass. The contractors are Messrs. Wright & Goodchild, of Croydon. The original contract sum amounted to about 3,000*l.*, which has been somewhat reduced by the omission of some of the work contemplated.

Gloucester.—The tenders for building the proposed new church in Barton-street have been opened and considered. Five builders in response to private invitation, had tendered, and the tender of Mr. James Clutterbuck, of Gloucester, was accepted. His estimate is 4,400*l.*, with the alternative of its reduction to 3,672*l.* if the committee decide to dispense with the west bay to the church. The building, which is designed by Sir Gilbert Scott, architect, will consist of a nave, south aisle, and chancel, with chancel aisle attached. The proposal to have a north aisle and tower has been postponed for the present. The building will be of stone, with oaken seats, all free, to accommodate 540 persons. The site (a plot of land adjoining the Midland Railway, at the corner of Lower Barton-street), cost 1,086*l.* The subscriptions paid and promised amount to 4,583*l.*, including 2,500*l.*, a donation of the Misses Hedley. There are still 1,000*l.* required.

Hull.—The new church of St. Barnabas, in this town, has been consecrated by the Archbishop of York. The new building is situate on the south side of the Hessle-road, at the eastern corner of the Boulevard, and near the western boundary of the borough. The desirability of erecting a church in the district, which is almost entirely laid out for building purposes, and sure, before long to be thickly populated, was considered a year or two ago, and the new edifice is the result. The cost of the church, with only a north aisle in addition to the nave, &c., leaving the south aisle to be completed when funds allow of it, has been found to be 3,100*l.*, and towards that amount the sum of 2,600*l.* has been promised or obtained. The edifice is built in the style of architecture which prevailed at the beginning of the thirteenth century, and consists of nave, north aisle, chancel, organ-chamber, and vestry. Accommodation is provided for 500 persons. The building is constructed of brick, faced externally and internally with red stocks; blue Staffordshire bricks are used in the interior arches, string courses, and patterns. The chancel has an apsidal termination, and is divided from the nave by an arch and sub-arch, with molded label, supported on shafted corbels

At the window-level an arcading runs round, supported on Bath-stone shafts, having moulded caps and bases. The ceiling is plastered in concave form, and, it is hoped, will at some future period be decorated. The roofs of nave and aisle are open-timbered, framed in trusses, with moulded and wrought timbers, resting on moulded stone corbels. The organ-chamber and porch have simply-framed rafter-roofs, and the whole of these ceilings are plastered between the rafters, the woodwork throughout being stained and varnished. The nave-arcade is carried upon octagonal shafts, with moulded caps and bases, and springers in Bath stone, these latter being incised and filled in with representations of Christian symbols and monograms. The vestry is separated from the church by a wrought chamfered and cusped screen; and this and the pulpit and choir-seats and communion-table are executed in red deal. The whole of the windows are glazed with tinted cathedral-glass in lead quarries. The gas-lighting of the nave is effected by jets round each cap, and that of the chancel by a series of lights running along the moulded string-course beneath the windows. The building at present appears rather one-sided, the north aisle alone having been erected, but it is hoped that ere long the temporary wall on the south side may be removed and another aisle built to correspond with the one now erected. The church has been erected on as economical a scale as possible, and is seated with chairs. The building has been executed from the designs and under the superintendence of Mr. Samuel Musgrave, of Hull. The contractors for the building were—Messrs. B. Musgrave & Son, bricklayers and plasterers; C. W. Foster, joiner; G. Taylor, mason; Gouldesbrough & Son, plumbers, &c.; Wilde & Sons, slaters; W. B. Leaning, iron-founder; and A. Wright, painter, all of Hull.

DISSENTING CHURCH-BUILDING NEWS.

Bromley. — The foundation-stone of a new Wesleyan chapel and school has been laid, on the Bromley Lodge Estate, fronting the high-road, near the railway station. Mr. Grubb, of Widmore-road, is the builder of the chapel. The cost of the building, land, and other expenses amounts to the total sum of 1,900*l.*

Pewsey.—The new Wesleyan chapel, erected in this town, has been opened with the usual services. The chapel, the foundation-stone of which was laid in July, had been erected by Mr. Barrett, of Swindon; the architects being Messrs. Lansdown & Shopland. It has a good elevation in one of the principal streets. It is built in Classical style, of red brick with Bath stone dressings. The interior walls are plaster; the windows are circular, with iron sashes, and it has a wrought-iron and framed roof. The sittings are open, of picked red deal (Archangel timber), stained and varnished, and the chapel is estimated to seat 250. The rostrum is stained a richer tint than the pews. The gas standards are formed so as to be inexpensive, the plain service-pipe, coloured a deep blue, running up to above the sittings, and then brass placed on the top, terminating, after a spiral column, in three jets. The total cost of the building, including the site, is 800*l.*

Torquay.—A new Wesleyan Chapel, called "Wesley Church," in Torwood-street, commenced last autumn, has just been completed and opened. It comprises a nave, with side aisles, separated by clearstories and arches, supported on light iron columns, with a transeptal appendage to the higher side of the main building, in which there is a side entrance, the organ-chamber being placed over this, but the chief entrance is under the tower, at the lower corner. Inside this, the front end, there is a small gallery for school-children and the choir. There is one large six-light window, filled with tinted glass, with tracery in front, three smaller two-light ones under the gallery, and one in the side entrance. The nave has seven bays, with six two-light windows on either side. The roof is framed with a collar-beam, up to which is red deal-matched boarding, stained and varnished, the open benches being of the same material. The dimensions of the chapel are 78 ft. long, by 50 ft. wide, with a chancel 11 ft. deep. At the right of the chancel is a vestry, and on the other side another room, which will be used for a school and other purposes. The tower rises to about 60 ft., terminating with a spire about 70 ft. high. Sufficient seat accommodation is provided for about 900 people. The building is of a simple Decorated character throughout, local limestone, of different tints, with Bath stone dressings, being used, the interior mouldings being formed of Watcombe terra-cotta, plaster, and stone. The builder is Mr. E. P. Bovey, Torquay. His contract amounted to about 3,530*l.*, besides which the site, purchased of Messrs. Harvey, cost 500*l.* for 99 years. Various other items for furniture and extras swell the total cost to about 4,600*l.* It is intended to build three class-rooms at the back with some accessories, and a large school-room by the side, 60 ft. by 30 ft. The plans were furnished by the Rev. John P. Johnstone, of St. John's-wood, London, and in his absence the work has been superintended by Mr. G. Soudan Bridgman, of Torquay, architect.

South Shields.—On the 4th inst., the new Unitarian Church in Derby-street, South Shields, was formally opened. The new building, which is called Unity Church, is in the Gothic style, with double-light lancet-windows in the sides, and circular tracery window in the front gable, over an entrance-porch. The internal fittings are all of pitch-pine. The edifice has an open-timber roof, the principals of which spring from small stone corbels. The church is seated with open pews to accommodate 250 persons. The woodwork is deeply stained and vanished. Under the church there is a schoolroom, ministers' study, library, and kitchen fitted up with requisites for tea-meetings. The heating apparatus was furnished by Whitaker and Constantine, of Manchester. The contractor was Mr. Joseph Nicol, of South Shields. Mr. Thomas A. Page, of South Shields, was the architect.

Tunbridge Wells.—A new Congregational Church has been opened for public worship here. The building, which is in the Albion-road, is in the Gothic style of the thirteenth century, and built of Kentish rag-stone, with Bath-stone dressings. It is entered by an open porch, having a central polished granite shaft, and thence by enclosed lobbies right and left. Internally the building at present appears as a single parallelogram, with an open-timbered roof. The walls are boarded as high as the seats. There is then a band of plaster, and above this the walls were faced with Gault bricks, the window-arches and doors being marked by stone bands and red bricks. The seating is all open, and lightly stained and varnished, ample space being allowed for each person, and the seats and backs are sloped. The platform is placed in front, on an arched recess (adopted for acoustic reasons) at the end, and the minister's and deacons' vestries, &c., closely adjoin. The artificial lighting is by means of ornamental gas pendants, with small standards to the platform. The heating is by means of hot-water pipes under gratings in the floor, and ventilation is effected by means of a continuous band of pierced boarding in the roof, with flags above, regulated by cords. The windows are glazed with green-tinted quarry rolled glass, which was specially manufactured for this building. Accommodation is provided at present for 400 persons, but future enlargement has been considered, and provision made when necessary. The work has been carried out by Mr. Steer, of East Grinstead, from the designs and under the personal supervision of Mr. John Sulman, of London.

Liverpool.—A new church, in Catherine-street, Liverpool, for the Welsh Presbyterian or Calvinistic Methodist denomination, has been opened for divine worship. The new church is a stone building, capable of holding about 500 people; but provision is made for the erection, at some future time, of galleries, to accommodate 300 more. The church consists simply of a nave, with two transepts, and a tower and spire, rising to a height of 127 feet. The tower is at the north-east angle, and stands upon a plinth, in the front or Catherine-street side of which is a doorway, with a recessed and moulded arch. In the four sides of the upper part of the tower are coupled windows, and above a sunk traceried parapet, at each angle of which rises an octagonal pinnacle. The lower part of the spire has double flying buttresses at the angles, surmounted by small square pinnacles. Above, the spire is perfectly plain. In addition to the doorway in the tower there is a doorway of somewhat similar design to the staircase. The windows are traceried, and glazed with cathedral tinted glass. In the interior, the transepts and organ-chamber are divided from the nave by moulded arches, partly carried upon corbel columns, with floriated capitals. The pulpit is of Caen stone, carved, and so placed that every one can see the minister. The roof is open-timbered, and forms, as it were, externally, a nave and aisles, but internally, it is in one span, without any intermediate support. The architects of the building were Messrs. T. E. Murray & G. H. Thomas, of Liverpool; and the contractors in chief, Messrs. John Parker & Son, of Liverpool and Manchester. The cost of the church, inclusive of the price of the land, will be about 6,000*l.* Including the sum realised by the sale of the Windsor-street Church, the congregation have, up to the present time, raised about 4,000*l.*, leaving a debt upon the building of 2,000*l.*

Books Received.

History of the Modern Styles of Architecture. By JAS. FERGUSSON, D.C.L. London: John Murray. 1873.

SOME of our readers will be glad to hear that a second edition of Mr. Fergusson's "History of the Modern Styles" is published. It has not only been revised throughout, but fresh matter has been introduced, including the results of a recent tour made through parts of Italy and France, with the object of verifying or correcting first impressions regarding buildings commented on. It will afford us materials for an article before long; suffice it at present for us to make known the publication of the volume, and to say, not merely that it is a work absolutely indispensable to every architect and architectural student, but that it ought to form part of the reading of every person desiring to be educated.

Illustrations of Fortrose Cathedral. From drawings by Mr. A. R. SCOTT, 37, George-street, Edinburgh.

THE Edinburgh Architectural Association awarded to Mr. Scott, for these drawings, a prize offered by Mr. Bryce, and have photographed them for distribution amongst the members. As the work of a student it is a creditable production. The date of the building is the beginning of the fourteenth century. According to local tradition, the author says, Cromwell's troops demolished it; "but," he continues, "probably like the fate of so many noble examples of ecclesiastical architecture, it was destroyed at the time of the Reformation." The next time he indulges himself with his little dig at the Reformation—a weakness which prevails amongst many who do not look beyond their nose—he may as well use decent English.

VARIORUM.

Capital and Labour is the title of a weekly paper issued by an association of employers with the view, in defence of their interests, of counteracting what they consider erroneous doctrines maintained and acted on by the other side. It commenced, as it seemed to us, with too strong an exhibition of bias and partisanship. The tone, however, has improved, and will doubtless continue to improve. Although the organ of the employers, it should seek to inspire the employed also with confidence in its truthfulness and the soundness of its views. The mere setting forth of the arguments adducible on one side, and the thick-and-thin advocacy of a class, would simply have the effect of rendering more distinct the division which exists. We take a paragraph from the last number on the subject of foreign competition:—

"An order was sent to a well-known firm in Shropshire for eight hundred tons of galvanised wire, subject to the price being found satisfactory. The sum quoted was 23*l.* 10*s.* per ton, and this was lower than the price of any other English maker. But a German house offered to supply goods of the same quality at 19*l.* per ton; and thus the order was lost to England. In other words, upwards of fifteen thousand pounds, which might have been expended in this country, has gone elsewhere. The same firm reports that within two or three years several large orders for iron girders have been sent to Germany, because the founders there could produce them at fifteen per cent. less than English makers." "In the face of such facts, it is in vain to seek to apply artificial rules as to wages and hours of work, and to say that the former shall not be allowed to sink below a certain level. A manufacturer, or a builder, having to execute a large and costly order, will naturally go to the market where the most advantageous terms can be secured; and if trade is driven out of the country, workmen will be among the first to suffer."

——In *Leisure Hour*, an Eastern sea-captain and traveller writes:—The lake dwellings in Switzerland are not so much without parallel in our own times as might at first sight appear. Actual lake dwellings I have not seen, but at Singapore,

on the right hand of the road leading from the Peninsular and Oriental Wharf, at the mouth of the small river which passes through the town, the Malays have a small village in the water, raised above it by posts and connected by bridges. The houses are of the simplest construction, more resembling booths at a fair than anything else; they are of one story only. Why they chose to build in this seemingly unfavourable position I do not know, unless it is from force of habit. It may tend to cleanliness; it may also provide food in the form of fish, and I suppose no rent is expected from them. This last may be the chief inducement. At Penang there are houses built on frames raised on posts, but when I saw them they were raised above dry sand; it is probable, however, that the sand is covered at times with water, either from the sea or from mountain floods, such as tropical showers produce."——*May's British and Irish Press Guide* contains some curious statistics, showing the present position of the newspaper and periodical press of the United Kingdom. It is shown that there are now 1,690 newspapers issued in the kingdom, of which the metropolis provides 410. 889 of the newspapers are published at 1d. The periodical publications in the United Kingdom number 662, 482 of these being monthly. 199 of the periodicals are issued at 1d. The increase in trade organs is remarkable, there being now 64.——"Pickwick," with fifty-seven illustrations by Phiz, and all for 3s., is an announcement that will send many new buyers to Chapman & Hall's.——*Laxton's Builder's Price-Book* for 1874 is the 57th edition, and has had time to grow into settled and accepted form. We have a strong suspicion that a builder who priced out all the items in his bills of quantities according to "Laxton," would have little chance of getting a contract as against one who priced them from his own experience; and doubtless this is well understood in the trade: when to use the price-book, and when not, is probably pretty generally known.

Miscellanea.

The Royal Commission on the Labour Laws.—The *Gazette* notifies the issue of a Royal Commission to inquire into the working of the Master and Servant Act, 1867, and of the Criminal Law Amendment Act (34 and 35 Vict., cap. 32), and whether any, and if any, what amendment or alteration in the provisions of those Acts, or either of them, is desirable, and also to inquire whether it is expedient to limit or define the law relating to conspiracy, either generally or as affecting the relations of masters and workmen. The Commissioners are—Sir Alexander James Edmund Cockburn, Baron Winmarleigh, Mr. Edward Pleydell Bouverie, the Right Hon. Russell Gurney, M.P.; Sir Montague Edward Smith, Mr. John Arthur Roebuck, M.P.; Mr. Thomas Hughes, Mr. Gabriel Goldney, M.P., and Mr. Alexander Macdonald, M.P.——At a special summoned meeting of the Trade Unions Parliamentary Committee, attended by all the members, "London and Provincial," the following resolution was unanimously passed:—It was proposed by Mr. A. W. Bailey, President of the Amalgamated Society of Tailors; and seconded by Mr. W. Rolley, President of the Sheffield Trade Unions Congress, "That this meeting of the Parliamentary Committee, elected by the Trade Unions Congress, representing more than one million workmen, specially convened to consider the action of the Government in appointing a Royal Commission upon the labour question, believes the same to be a mere excuse for delay, and we adhere to the resolution already passed deprecating the appointment of the Commission, and we hereby pledge ourselves to continue to protest against the whole scheme as being a surprise, an intrigue, and a fraud; and we further recommend the whole trade unions of the country to refuse to have anything to do with the Commission, either in the way of giving evidence or recognising in any way the action *pro* or *con.* of the Commission."——The Engineers' Advance of Wages Conference have passed a resolution deprecating the action of the Trade Unions Parliamentary Committee in condemning the appointment of a Royal Commission upon the Labour Laws, questioning the right of that body to put forth the statement that they represent more than a million working men, and expressing an opinion that Mr. Macdonald, M.P., and Mr. Thomas Hughes were quite right in accepting places upon the Commission.

Public Schools for the Middle Classes.—A meeting has been held in the Town Hall, Tamworth, for the purpose of promoting "the building of cheap public boarding-schools for boys and girls, in union with St. Nicholas College." The Vicar of Tamworth (the Rev. Brooke Lambert) occupied the chair, and the Earl of Shrewsbury and the Rev. Canon Lowe, D.D., attended to lay before the meeting the plans of the society, with a statement of its operations. There was a very large attendance, and among those present were several clergymen and leading gentlemen of the neighbourhood, in addition to a great many ladies. Lord Shrewsbury, in the course of his address, said he was there to oppose his friend Col. Dyott, who told them that Denstone was the abode of confession, and asked if they could believe it possible for him and his father to have been in favour of auricular confession. Dr. Lowe moved the following resolution:—"That this meeting recognises the value of more systematic education for girls, and pledges itself to support schools on the system now in use at Denstone." The Earl of Shrewsbury seconded the motion. Mr. Skey moved the following amendment:—"That this meeting, whilst recognising the value of more systematic education for girls, declines to pledge itself to support schools on the system now in use at Denstone." Mr. J. Neville seconded the amendment, and the latter was declared carried by a large majority, only about half a dozen hands being held up for the original motion.

The Excavations at Rome.—The excavations at the Coliseum are proceeding very slowly, the irruption of a copious spring of water having submerged the foundations of the arena. The excavations on the Esquiline continue to furnish interesting results. A statue of Fortune has been found in one of the rooms of an ancient Roman house recently unearthed. In removing the rubbish which covered the edifice it was found that an exact reproduction of the statue had been painted in fresco on one of the walls. Several discoveries have been made in the Villa Altieri grounds, including an admirable onyx cameo of an oval form, 58 millimetres by 43. The relief represented two half-figures veiled. On the left side of the Via Merulana, a vast hall has been brought to light, one end of which terminates in a circular apse, around which five square niches open out. The walls are covered with a *couche* of vermilion, on which are designed griffin-shaped ornaments, comic masks, meanders, &c. In the interior of the niches were painted views of gardens adorned with exotic plants and flowers, on which are perched birds very gracefully designed. The municipal commission of archæology proposes, says our authority, the *Morning Post*, to preserve this monument of ancient domestic architecture, which might serve as an ornament to the new piazza.

Sale of the Victoria Theatre.—The lease of the Victoria Theatre, Waterloo-road, has been sold by order of the mortgagee. It appeared from the published particulars that the property is held for an unexpired term of 23½ years, at a yearly rental of 1,400*l.*, "subject to certain rights reserved by such lease, and subject also to prior determination in the events therein mentioned." It was also stated that the whole of the interior of the theatre, including the fittings, decorations, and stage machinery, which were constructed not more than two years ago, at an expenditure of 9,000*l.*, when the whole of the interior was remodelled, were included in the purchase, but that the scenery, properties, and bar utensils would have to be taken by the purchaser at a valuation. The auctioneer, before offering the property, endeavoured to show that the rental paid by the tenant of the refreshment-bars, and other payments in the form of sub-lettings, amounted to nearly 1,200*l.* The biddings commenced at 500*l.*, and the lease and property in the theatre were knocked down to Mr. Villiers, of the London-road, for 820*l.*

Margate Theatre.—The following are the tenders for pulling down and re-building the Margate Theatre, Mr. J. T. Robinson, architect:—Jones & Fulford, London, inclusive of gas-fittings, decorations, and upholstery, 5,380*l.*; Judd & Hawkins, London, building only, 3,450*l.*; Bushell & Sons, Margate, inclusive of gas-fittings and decorations, 4,410*l.*; Paramor & Son, Margate, inclusive of gas-fittings and decorations, 4,165*l.* (accepted, subject to modifications of the designs and cost).

Interesting Discovery in Whitchurch Parish Church.—The discovery of the bones of John Talbot, first Earl of Salop, in Whitchurch Parish Church, has excited general interest. It was known that a silver urn containing the embalmed heart of the great soldier was found among the ruins of the ancient church, and that it had been deposited beneath the porch or vestibule, but there appears to have been no record or even tradition in the parish of his bones having been brought over from France and buried within the sacred precincts. Recently, however, while the workmen were removing the recumbent figure of Talbot from its position in the south aisle, preparatory to the restoration of the side and canopy, it became evident that there was something of the nature of a coffin immediately beneath the effigy. On closer examination bones were apparent, the woodwork having fallen into decay. The remarkable fact that each bone was carefully wrapped in cerements, and the position in which they were found, places it beyond a doubt that they are none other than the bones of the Great Talbot, who fell at Chatillon, in France, A.D. 1453. At the back of the skull was an opening, apparently caused by a battle-axe. It is expected there will be a public interment of the remains in the porch, where the heart is believed to lie.

Decoration of the Exchange, Sandhill, Newcastle-on-Tyne.—Out of numerous designs for this work, the committee chose that of Mr. John G. Green, of Gateshead. The roof is supported by a series of arches resting on stout pillars, treated in imitation of Peterhead granite, the capitals in grey or Aberdeen granite. On the wall, between each keystone, on a light ground, is a spandrel, centred by different national arms of Europe and America, boldly painted. This is surmounted by a frieze, stronger in colour and broken at intervals by oblong squares, on which are written in white letters the names of different countries and their principa seaports. On the light roof, circles of ornament attract the eye easily from wall to wall, an passing into the east end, on the circle next the roof, is a broad band of blue, on which is the text, "The earth is the Lord's and the fulness thereof." The centre spandrel contains the arms of Newcastle, and in the other two are smals figures emblematic of industry and commercel Round the outer wall, and about 4 ft. from the base, runs an ornament, from which to the floor is a uniform colour much deeper in shade. In the news-room the pillars are here treated with coloured ornaments on a light ground, the centre of each spandrel containing a small figure (typical of the seasons) in monochrome.

Sale of Public Buildings in Italy At a sitting of the Chamber of Deputies, February 27, Signor Minghetti, Minister of Finance, proposed the sale of several public buildings to the municipalities of the different towns in which they are situated. According to the *Academy*, among the most important of these sales is that of the Palazzo Riccardi at Florence, the stately residence of Cosmo "Pater Patriae," and inhabited by the Medici family until the end of the seventeenth century. This palace, celebrated for the majestic severity of its architecture, is a noble specimen of the Florentine fortress style. Within, the galleries are richly decorated, the ceilings by Luca Giordano. Here the Academy Della Crusca held its sittings, and compiled its Dictionary. The Government, in selling the palace, retain the rooms containing the Riccardi library, and stipulate that the paintings of Luca Giordano and the frescoes of Benozzo Gozzoli, which adorn the chapel, shall be carefully preserved, and free access to them given to the public.

New Lectern at Wolverhampton Parish Church.—A carved oak eagle lectern, of somewhat elaborate design and execution, has been put up in the parish church of Wolverhampton. The pedestal consists of three stages, the lowest being plainly chamfered, the second enriched with inlay and a battlemented cornice, and the third has a gabled pediment on each side, crocketed and finished with a terminal cross. The pediments are panelled, and contain shields. At each corner is the statuette of an angel in the attitude of prayer, the wings being turned upwards round the moulded base of the column which supports the eagle. The total height is 7 ft. The work has been executed by Mr. Masey, of Louth, under the superintendence of Mr. James Fowler, architect. The carving is the work of Mr. Ruddock, of London. This lectern is a gift to the church

Engineers in the Present House of Commons.—It has been notified to us that the following members and associates of the Institution of Civil Engineers have obtained seats at the recent elections:—"Members: Messrs. I. Lowthian Bell, North Durham; C. E. Cawley, Salford; J. Hick, Bolton; E. J. Reed, C.B., Pembroke; H. Robertson, Shrewsbury; J. P. Romayne, Cork; J. D'A. Samuda, Tower Hamlets; and B. Samuelson, Banbury. Associates: Messrs. J. Ashbury, Brighton; H. W. F. Bolckow, Middlesbrough; T. Brassey, Hastings; A. Brogden, Wednesbury; D. Chadwick, Macclesfield; the Right Hon. Lord Robert Grosvenor, Flintshire; Sir W. V. Harcourt, Q.C., Oxford City; Colonel J. M. Hogg, Truro; Sir H. Johnstone, bart., Scarborough; G. Leeman, York; S. Lloyd, Plymouth; C. M. Palmer, North Durham; Captain Bedford Pim, R.N., Gravesend; A. C. Sheriff, Worcester; C. Waring, Poole; and Sir F. M. Williams, bart., Truro." English architecture has not, we believe, a single representative in the House.

Pullman's Hotel Cars on the Midland.—The Midland Railway Company have entered into a contract with the Pullman Palace Car Company for a term of years, and for the future the sleeping-car saloons will be at the disposal of such passengers as can afford to pay the extra fee which will secure them. The Pullman Company provides the cars, furnishes, serves, and keeps them in order, leaving the railway company to light, warm, and look after the carriages to the same extent as would be observed with their own rolling stock. The first of them have made a trial trip to Bedford,—rather a short trip for a trial of the beds. They are elegantly fitted up. The parlour car is for short lines and day travel only. It is 50 ft. long, carpeted, upholstered, and furnished. There are separate saloons of the private box order for small family parties. The drawing-room and sleeping-car is alternately a drawing-room, a dining-room, and a sleeping apartment, with removable tables, convertible seats, and so on.

New Primitive Methodist Chapel and School Buildings, Ardwick, Manchester.—Designs for the above buildings have been submitted in competition by a limited number of local architects. The committee have selected that sent in by Mr. William Dawes, of St. Ann's Churchyard, and have instructed that gentleman to proceed at once with the work. The buildings will be in the Gothic style, and will be faced with stone. The chapel will have a tower and spire, transepts, galleries, and an apse behind the pulpit for the reception of the organ, &c. The site is triangular in form, and the planning therefore required more than usual study. The schools are two stories in height, and are supplemented by six class-rooms, three on each floor. The usual offices and conveniences are arranged in the mezzanine floors and the basement. To the chapel are annexed two vestries and a library, and there will be a chapel-keeper's residence in the corner of the site nearest Higher Ardwick. The contemplated cost is 7,000*l.*

The Benefit of Brick.—A recent fire in Palmer's great new hotel at Chicago afforded an instructive illustration of the benefit of fire-proof construction. In the absence of the occupant of a room the porter had built a fire in the grate and locked the door. The fire by some means reached the carpet and spread to the floor and walls—the cracking of which gave the first intimation of the mischief on foot, and caused its immediate extinction without further trouble. And yet it is calculated the burning must have been going on quite three hours. The whole mystery of such retardation and harmlessness is told in the fact that the room rested on brick arches and iron girders, with cement for floors and hollow brick and hard plaster for partitions. This made the whole difference between a charred room and, probably, a mighty conflagration.

Fall of a Tunnel.—About 12 yards of the railway tunnel under Fishergate, Preston, has fallen in upon the line. During the previous week this portion of the tunnel had been bared, and it is supposed that the late heavy rains had sapped the work after the removal of the surrounding earth. An engine-driver was passing through the tunnel at the time the accident happened. The falling mass separated above him in its descent, or he would have been instantly killed; as it was he was greatly injured.

The New Buildings Bill. — Sir W. Codrington has given notice, at the Board of Works, that on bringing up the report of the Works and General Purposes Committee, submitting the Metropolitan Buildings and Management Bill for approval he will move,—

"That the new clause in the Metropolis Bill (the 25th), by which an owner or occupier is authorised to build a portion of a party wall upon ground, the property or in the occupation of another person, is wrong in principle, and should not be introduced or sanctioned by the Metropolitan Board."

"That the 25th Clause, with the clauses and schedules by which it is to be carried out, be omitted from the Bill."

"That in order more effectually to prevent fire communicating from one roof to another, the dividing-wall of a dwelling-house should be of the same height above the roof as that proposed for a warehouse, viz.—not less than three feet."

"That an alteration to this effect be made in the Bill."

New Mortuary.—The vestry of St. Martin's-in-the-Fields have erected in the old parish burial-ground, Drury-lane, a mortuary house, for the reception not only of the bodies of parishioners, but also of those of persons residing in the adjoining parishes of St. Giles, &c. The mortuary has been fitted up with air-tight glass coffins, and all the proper appliances for the decent conducting of *post-mortem* examinations. A code of rules explaining the regulations of the mortuary has been printed, and a regular house-to-house distribution of the same has been successfully effected. The building has been examined by the Coroner and medical practitioners of the district, and a unanimous expression of thanks to the vestry has been accorded.

"Cromwell on his Farm."—This is the title of a picture by Mr. Madox Brown, recently completed. Cromwell, about thirty years of age, and before his entry upon public life, is traversing his farm on horseback, Bible in hand, and falls in with some of his men clearing the hedges and burning the refuse. The incident has probably induced a train of thought which renders him oblivious to a shouting maid-servant, sent by Mrs. Cromwell to bring him back to the house, while pigs and other concomitants of a farm run under his floundering horse's legs. The contrast between the abstracted man and the surrounding incidents is striking, not to say venturesome, but the power of the painter brings him through it successfully. The picture must take its place amongst the best works of the present day.

Bradford Assistant Borough Surveyor. Some time ago the Bradford Town Council decided upon appointing an engineer to superintend the street and drainage works of the Corporation, at a salary of 400*l.* a year. No fewer than fifty applications were sent in, and these were dealt with by a sub-committee, who submitted to the Street and Drainage Committee, at their meeting on Tuesday, the names of Mr. John Allison, town surveyor, Jarrow-on-Tyne, and Mr. George Jerram, of the Manchester city surveyor's office, as the two most eligible candidates. After some discussion, the committee resolved to recommend the appointment of Mr. Allison, and the recommendation will come before the Council at its next meeting.

A Service Reservoir at Huddersfield.—The Mayor of Huddersfield has formally opened a service reservoir at Westhill, constructed to hold a million and a quarter gallons. The height above the sea level is 495 ft., and from the Wessenden reservoir, whence the supply is derived, 1,030 ft. The area of the surface-water is 3,000 yards, and the area within the enclosure of the walls is just an acre. The work was done under the superintendence of Mr. Stanway, managing engineer for the corporation, and Mr. Crowther, resident engineer. The reservoir is intended to supply the inhabitants who live below a level of 400 ft., and will be worked in conjunction with the Spring-street tank.

Big Trees.—Mr. Walter Hill, the Government botanist in Australia, reports to the Queensland authorities that, while cutting a given line on the banks of the River Johnstone, for the purpose of examining the land, an enormous fig-tree stood in the way, far exceeding in stoutness and grandeur the renowned forest giants of California and Victoria. Three feet from the ground it measured 150 ft. in circumference; at 55 ft., where it sent forth giant branches, the stem was nearly 80 ft. in circumference.——The largest tree in Brookline N.H., has just been cut and sawed. It was a pine, 139 years old. The first log, 13 ft. long, made 800 ft. of inch boards, the whole tree 3,317 ft.

The New Alexandra Palace. — We are informed that Lord Londesborough has offered to the Alexandra Palace Company the loan of his valuable collection of arms and armour, which it is the intention of the executive to exhibit to the best possible advantage. This collection was made by the late Lord Londesborough at great cost, and comprises unique specimens of ancient arms and armour, many Celtic ornaments, and other objects of great historic and general interest.

Macclesfield Surveyorship.—The surveyor, Mr. H. S. Aspinwall, having resigned, in consequence, as we understand, of not being allowed to increase his income by doing business privately on his own account, and his resignation having been accepted, the town council have resolved to advertise for a new surveyor, who is to have 200*l.* a year, and not to be allowed to do private work.

National Museums. — Mr. Mundella has given notice in the Commons that on an early day he will call attention to the report of the Science Commissioners on National Museums, and move that, in the opinion of the House, steps should be taken to render national museums and galleries of art more available for instruction for the purposes of science and art.

The Fine Arts in Ipswich.—It is reported that at last the question of a picture-gallery for Ipswich is being seriously considered. Besides the educational effect of a public library, there is a belief that, commercially, a good collection of works, especially by local artists, would further add to the prosperity of the town; and local artists *are* at work.

Gift of a Public Park to Dingwall, Scotland.—Sir James Matheson, bart., of Lewis, has just intimated to the Town Council of Dingwall, in Cromarty Firth, his intention of presenting the burgh with a field on his property to be used as a public park, on condition that the Council suitably enclose and embellish it. Sir James was at one time Provost (Mayor) of Dingwall.

Fire in a Mansion.—Mr. Ormsby Gore's mansion, near Oswestry, has in great part been destroyed by fire. Happily, the pictures, statuary, and other works of art were saved, together with a valuable collection of books.

TENDERS

For Cricket Pavilion, Cambridge. Mr. W. M. Fawcett, architect:—

Tooley	£2,293	0	0
Bell	2,229	0	0
Gray	2,134	0	0
Loviday	1,987	0	0

For addition to mansion (conservatory), Blackmoor-end, Kimpton, for Mr. R. B. Baxendale. Mr. George R. Isborn, architect:—

Gilmour	£1,698	5	6
Messrs. Avery (for blinds)	48	12	0

For the erection of a new brewhouse and other buildings, and chimney-shaft at Towcester, for Messrs. P. & R. Phipps. Mr. R. Davison, architect. Quantities supplied by Messrs. R. L. Curtis & Sons:—

Wheeler	£4,640	0	0
T. & O. Orchard	4,299	0	0
Clark	3,900	0	0
Ireson	3,466	0	0
Claridge	3,380	0	0
Dunkley (accepted)	3,299	15	9
J. & J. Davis	3,273	0	0

For the erection of a shop and residence, Dovercourt, Essex, for Mr. S. Watts. Mr. G. Gard Pye, architect:—

E. & E. C. Gilbeons	£901	0	0
Butcher	893	0	0
Sealey & Wells	889	0	0

For building two villa residences on the west side of the Portsdown-road, Maida-vale, for Mr. T. Smith. Mr. P. Wilkinson, architect. Quantities supplied:—

Longmire & Burge	£4,700	0	0
Stimpson & Co.	4,660	0	0
Brass & Son	4,020	0	0
Hind	3,993	0	0
Temple & Foster	3,980	0	0
Cross & Son	3,859	0	0
Thompson & Smith	3,500	0	0

For schools, masters' residence, and boundary walls for the Shoreham School Board, near Brighton. Mr. A. R. Came, architects:—

Eldridge	£3,098	0	0
Wells & Mills	3,075	0	0
Colwell	3,000	0	0
Mills	2,998	0	0
Longley	2,995	0	0
Terry	2,892	0	0
Watson	2,760	0	0

For house at Leytonstone for Mr. Ritter. Messrs. T. & W. Stone, architects:—

Arber	£597	0	0
Howard	519	1	0
Hinds (accepted)	499	0	0